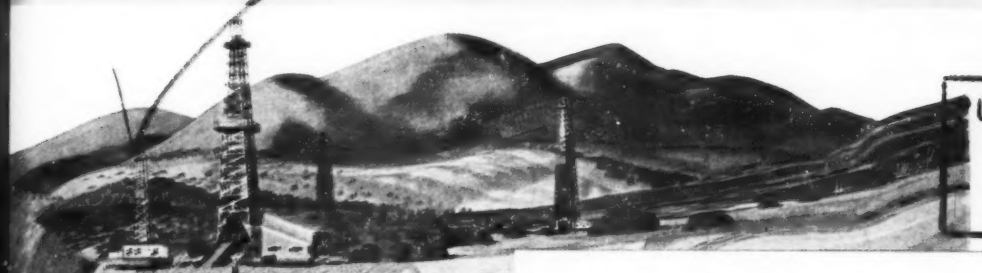
TECHNOLOGY DEPT.

the OIL AND GAS JOURNAL



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DETROIT

Drilling in crooked-hole country?

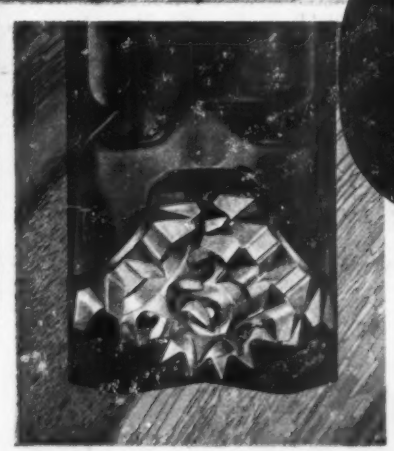
FIELD-PERFORMANCE RECORDS in crooked-hole areas have proved that, with proper weight and drilling procedure, *Hughes Rock Bits drill straighter holes faster.* Generally, if the bit *should* start off, holding up on the weight will help bring the hole back.

It is especially important when drilling in crooked-hole areas not to run your bit until the teeth become too dull. Dull teeth necessarily require more weight to drill efficiently.

Hughes Rock Bits have set footage records in crooked-hole regions all over the country. It is this record for fast footage—proved in field after field all over the world—that has made Hughes Rock Bits the first choice of the drilling industry.

The selection of the proper type of Hughes bit depends upon the area and formation being drilled. There is an experienced Hughes representative in your area who will gladly recommend the correct type of rock bit for your particular formation or area.

HUGHES
TOOL COMPANY
HOUSTON, TEXAS



HUGHES ROCK BITS

World Standard of the Industry

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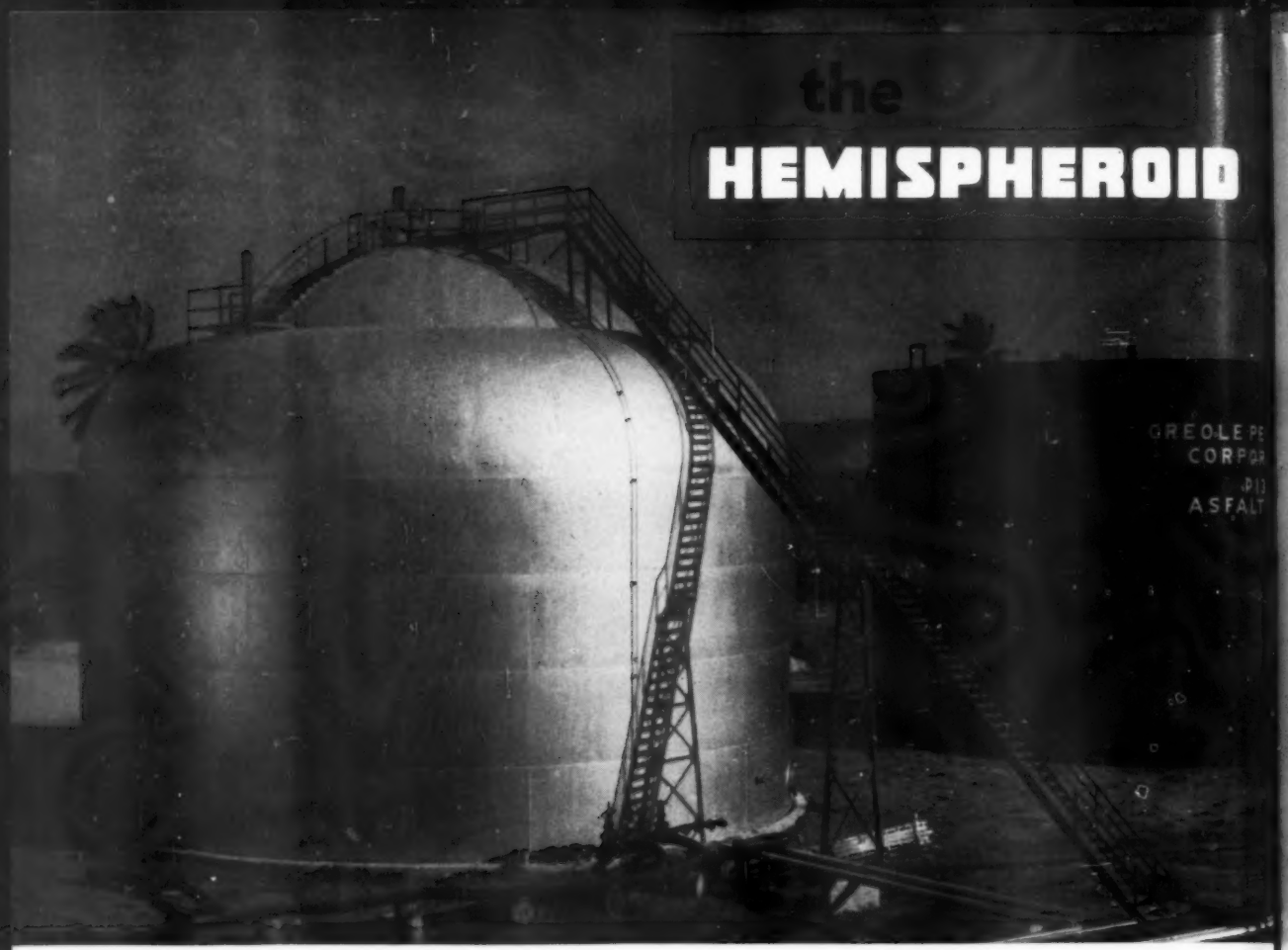

efficient pressure storage in an economical "package"

The Horton Hemispheroid combines the advantages of pressure storage with the economical construction cost of conventional storage tanks. When you are storing motor and natural gasolines, consider the benefits this combination may have for you.

The use of pressure storage has two important advantages. First, uncertainty regarding evaporation losses is eliminated. No loss can take place while the internal pressure is below the pressure relief valve setting. A glance at the relief vent will indicate if any loss is occurring.

Secondly, internal pressure is entirely independent of the volume of the vapor space in the tank. Therefore, for standing storage at a given working pressure, the Hemispheroid is just as efficient nearly empty as it is when almost full. Thus it is well adapted for use at bulk stations or marketing terminals where containers are filled and emptied only a few times per year.

Add low cost to these benefits and it is evident that the Hemispheroid means *efficient storage in an economical "package."*

Hemispheroids are built for working pressures of 2½ lbs. in capacities up to 30,000 bbls. and 5 lbs. per sq. in. for capacities up to 7,500 bbls. Bulletin E tells you how to select the proper capacity and working pressure for your requirements. Write our nearest office for a copy.

**Trade name for products built by the Chicago Bridge and Iron Company.*

Other HORTON* products
for the petroleum industry

- **HORTONSPHERES** — for storing butane, butane-propane mixtures, and materials of similar volatility.
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Save Time—Save Money. With this simple, rugged portable device, it is possible to save in excess of 50% of the time generally required to lubricate Lubricated Plug Valves. It will economically and efficiently handle the stiffest grades of Walworth lubricants.

The gun is self-priming, may be used in any position, and because of its safety features cannot injure the valve.

High pressure button type grease gun fittings—instead of the lubricant screw which is usually furnished—are available for installation on the valve. By painting the valve a distinguishing color to show the service under which the valve operates, and painting the barrel of the gun with the same color, untrained personnel can lubricate valves with the assurance that the correct lubricant has been used.

Walworth has improved and simplified its lubricants so that with a minimum of nine lubricants it is now possible to handle satisfactorily practically all industrial services. The new Walworth 517 and 514 lubricants will take care of 95% of the service conditions encountered in the handling of Petroleum Products and Gas Pipe Lines. The other seven lubricants will take care of most other petroleum, chemical, and industrial services.

All Walworth lubricants are available in Jumbo stick size, individually wrapped and packed 10 sticks per box. Two Jumbo size sticks will completely fill the barrel of the Walworth Lubricant Gun.

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With Fairbanks-Morse 8-Cover Side-Pot Duplex Power Pumps, it's no trouble at all to get an outstanding record for long, economical service.

These pumps are built to last—*and do!* They are ruggedly designed and built to the conservative standards of oil field pump practice. No sacrifice in design, materials and manufacture has been made to achieve lighter weight. For, after all, light weight in oil field power pumps is not important . . . strength and liberal safety factors are! Here's why Fairbanks-Morse Power Pumps have set dependable performance records wherever they have been used. When you want the best in power pumps . . . in service . . . dependability . . . freedom from excessive maintenance and repairs, the name is Fairbanks-Morse.

Fairbanks-Morse Power Pumps are available in fully bronze-fitted, oil-fitted or slush-fitted styles. For all the facts, see your supply store or write Fairbanks, Morse & Co., Chicago 5, Ill.

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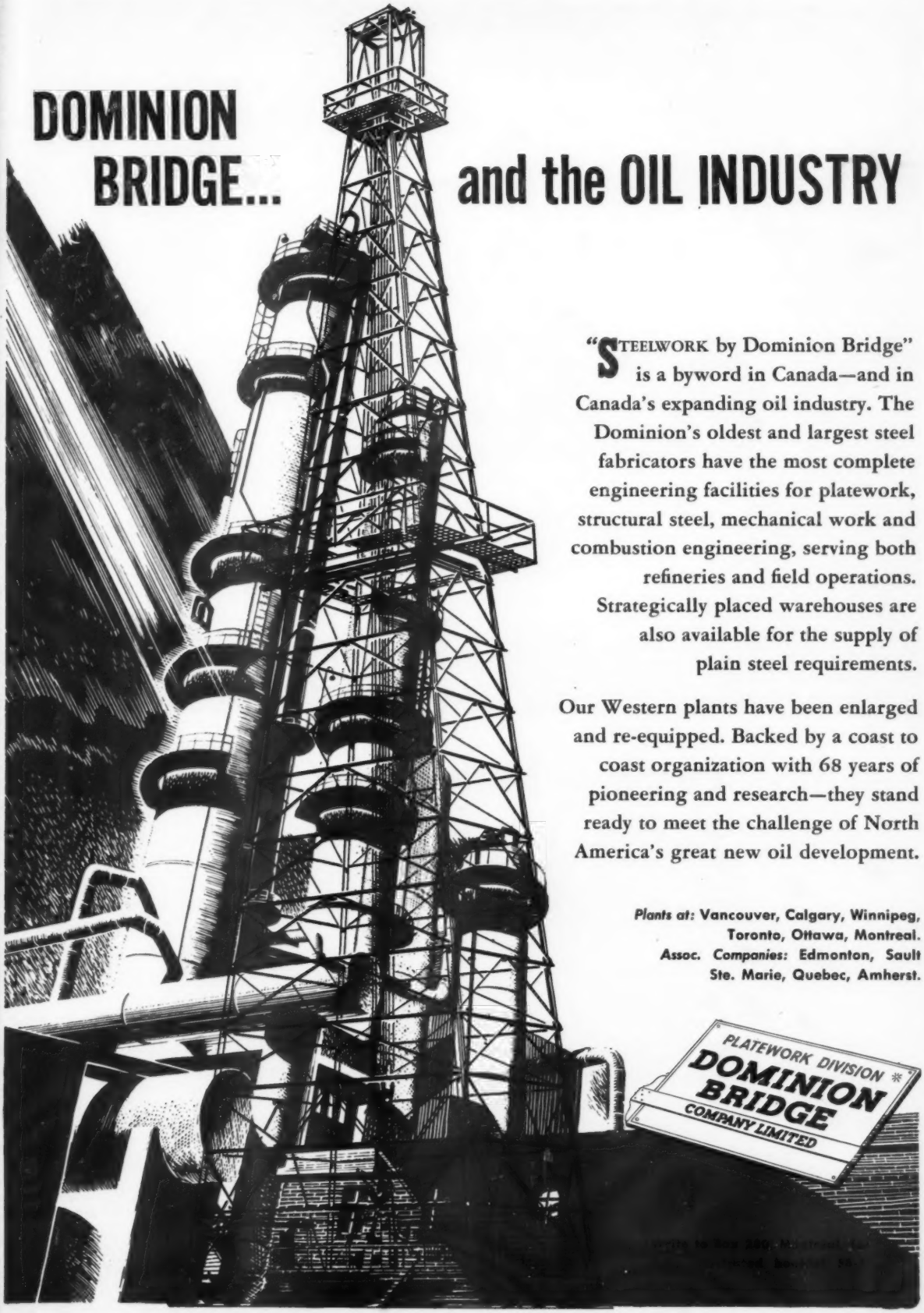

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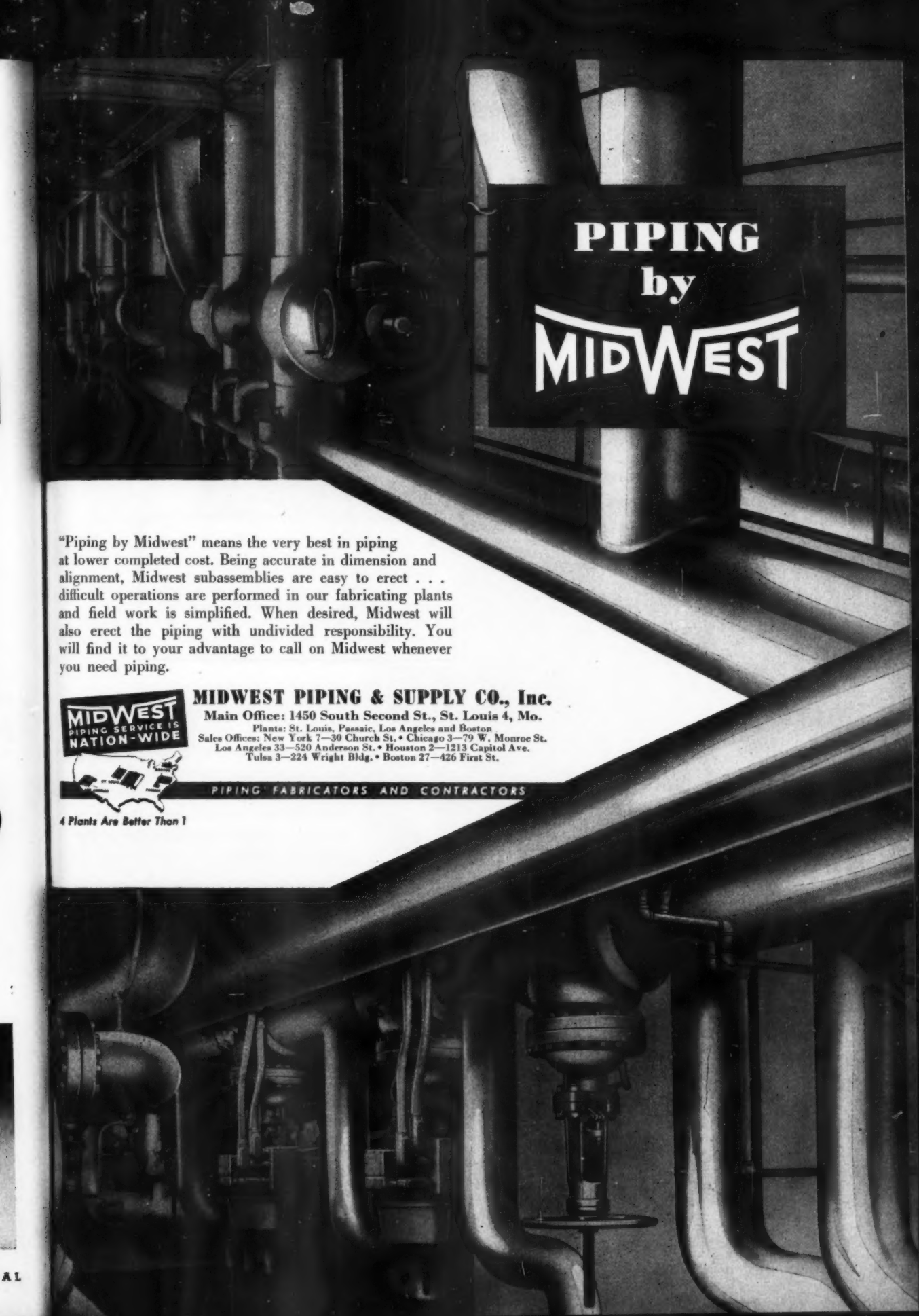

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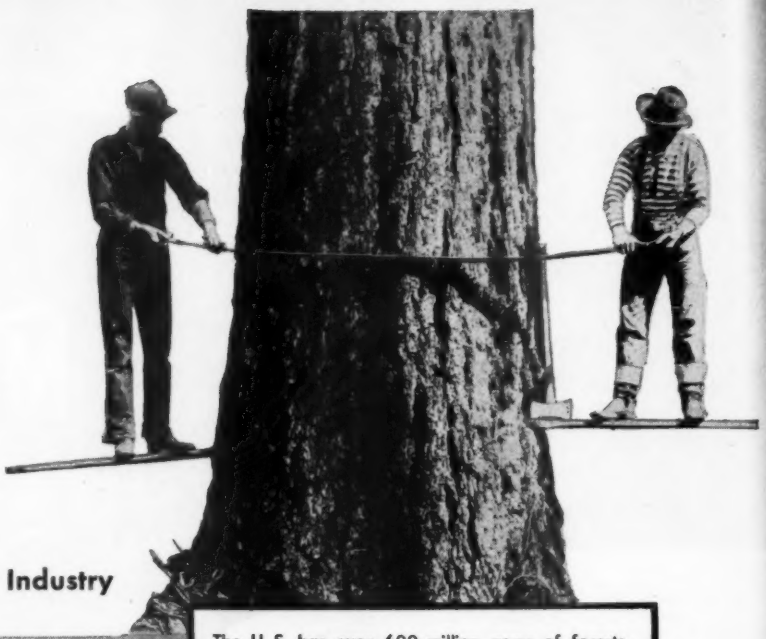
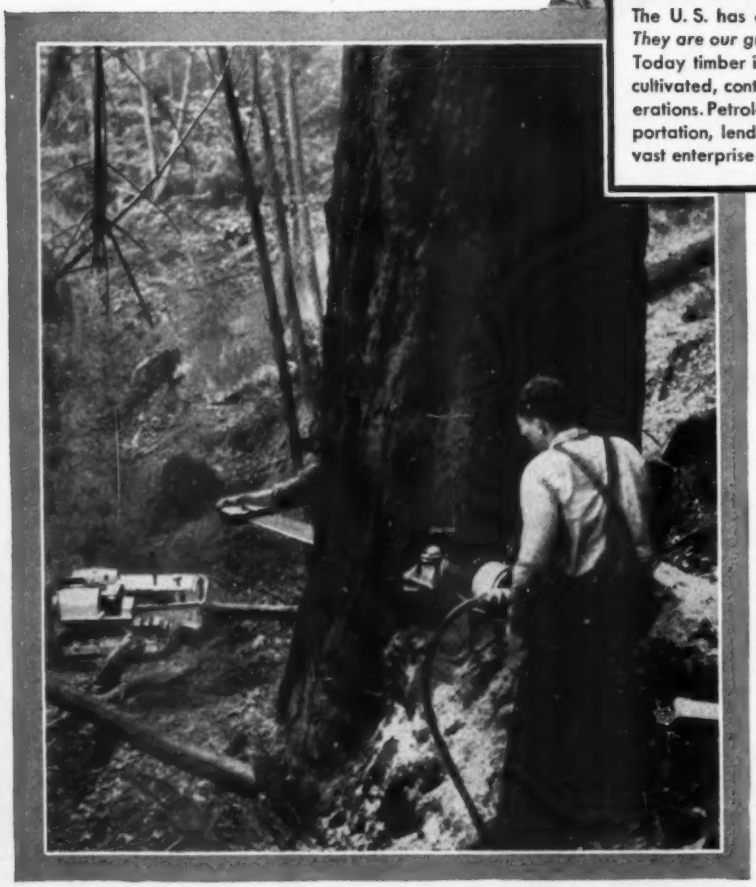


Petroleum Progress serves the Lumber Industry

The U. S. has over 600 million acres of forests. *They are our greatest renewable natural resource.* Today timber is considered a crop. It is zealously cultivated, continually replanted—for future generations. Petroleum, for light, heat, power and transportation, lends a powerful helping hand to this vast enterprise—and to its conservation program.



LOGS INTO LUMBER. That was a back-breaking job when America was young. Today, much of this load has been shifted to machines—thanks to petroleum, which provides the power and lubrication.

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Thus petroleum research contributes mightily to the nation's housing problem. Over 80% of all homes are chiefly of wood construction. And in countless other ways in which lumber is used, petroleum research aids our national economy.

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Petroleum Promotes Progress

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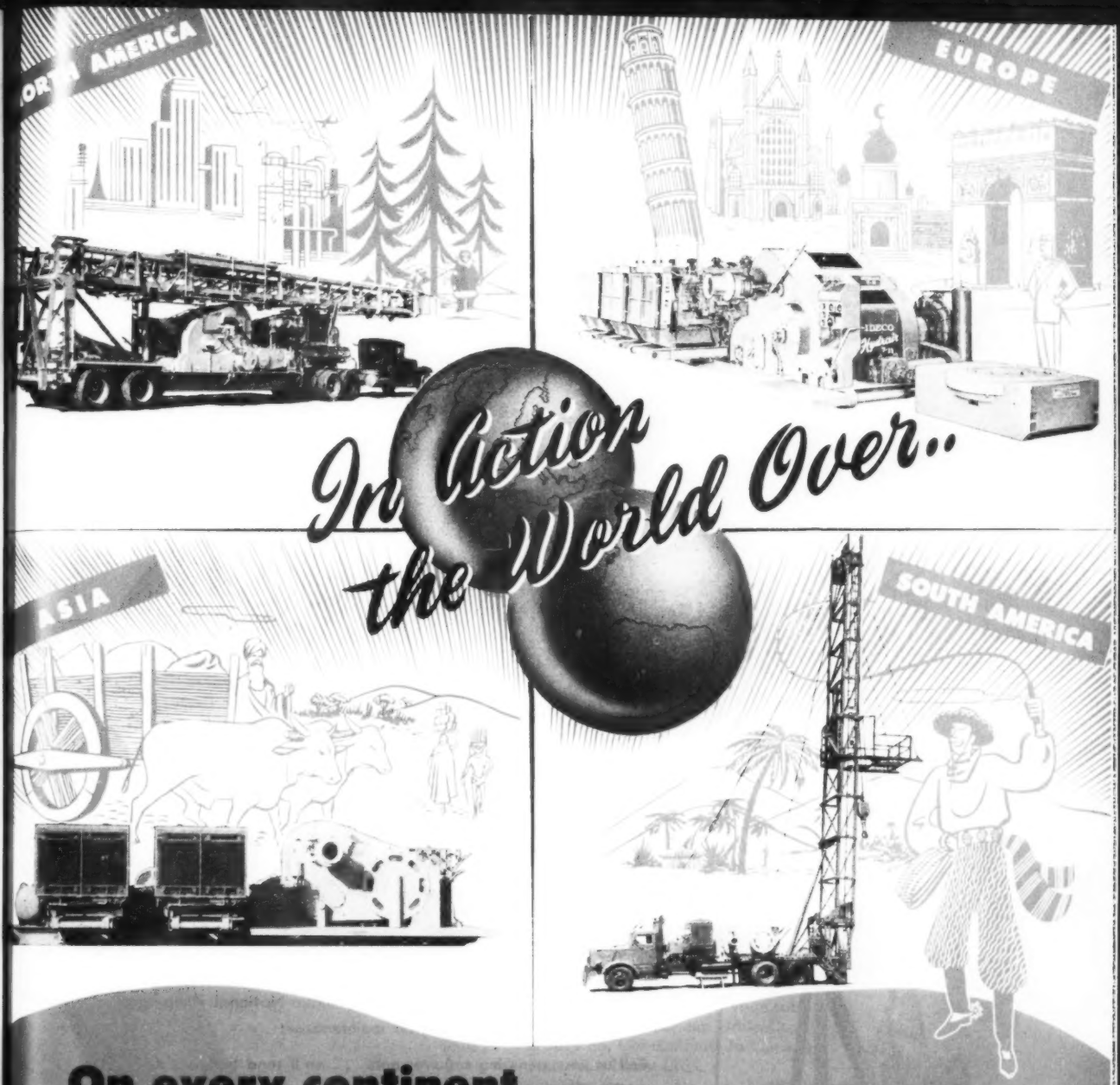

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For general information on ANACONDA Duplex Tubes write for Publication B-2. And remember that ANACONDA metallurgists are always ready to help you solve your tube problems. Address The American Brass Company, Waterbury 88, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

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For efficient heat transfer

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Here are 15 money-saving features of the most efficient V-belt drive. Only Worthington Multi-V-Drives give you all 15!

These Features Save You Money	For These Reasons	It's a Worthington—
1 Two-piece QD sheave—rim and hub separate	Mount light hub first, then slide heavier rim on tapered hub	EXCLUSIVE
2 Choice of one or two-piece assembly	Mount hub and rim separately, or loosely assemble hub on rim and slide on shaft together	EXCLUSIVE
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4 Clamp screw in hub	Holds hub in position on shaft while setting or removing rim	EXCLUSIVE
5 Taper-mated hub and rim	Mount easily in any position—no key-way between taper surfaces	ORIGINAL
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8 Shaft key lock (set screw over keyway)	Prevents key from drifting	EXCLUSIVE
9 Quickly-detachable (QD)	Pull-up bolts used as jack screws to remove sheave rim	ORIGINAL
10 Interchangeable rims	Hubs for every bore—lower inventory cost	ORIGINAL
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12 Choice of "A", "B", "C" and "D" grooves	"Tailor-made" grooves give proper belt "ride-out" for maximum life efficiency	ORIGINAL
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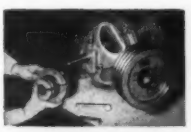
14 Offset design of sheave	Reduces over-hang loads—increases bearing life	ORIGINAL
15 Worthington-Goodyear V-belts	Load-carrying cords in neutral axis reduce internal friction—each belt carries its share of drive load	ORIGINAL



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Pound for pound, *Kidde* Dry Chemical Fire Extinguishers give you more *protection* for fires in flammable liquids, live electrical equipment and for textiles.

Proof? Factory Mutual Laboratories requires a 20 lb. dry chemical fire extinguisher, in the hands of an experienced operator, to effectively cover 25 square feet of burning area. *The Kidde 20 pounder covered 36 square feet . . . a 44% margin of safety!* And—the tests require a 30 pounder to cover 35 square feet . . . *but Kidde's Dry Chemical extinguisher reached out 48 square feet!*

Why is Kidde better? A special Diffuser Horn applies heat-absorbing, fire-smothering dry chemical in an effective cloudlike pattern that blankets the danger area, helps eliminate splashing of burning liquids, and protects the operator from heat.

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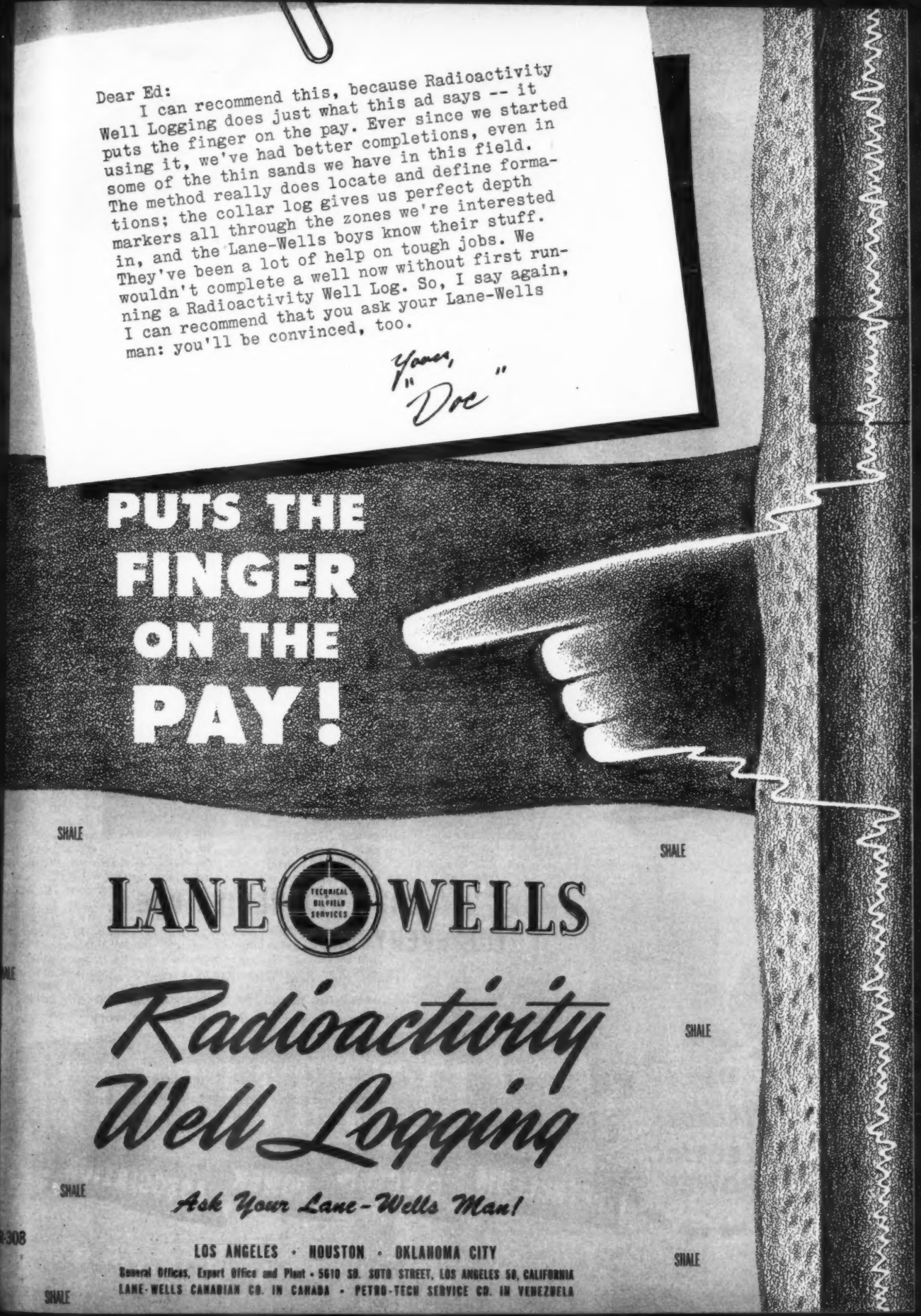
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I can recommend this, because Radioactivity Well Logging does just what this ad says -- it puts the finger on the pay. Ever since we started using it, we've had better completions, even in some of the thin sands we have in this field. The method really does locate and define formations; the collar log gives us perfect depth markers all through the zones we're interested in, and the Lane-Wells boys know their stuff. They've been a lot of help on tough jobs. We wouldn't complete a well now without first running a Radioactivity Well Log. So, I say again, I can recommend that you ask your Lane-Wells man: you'll be convinced, too.
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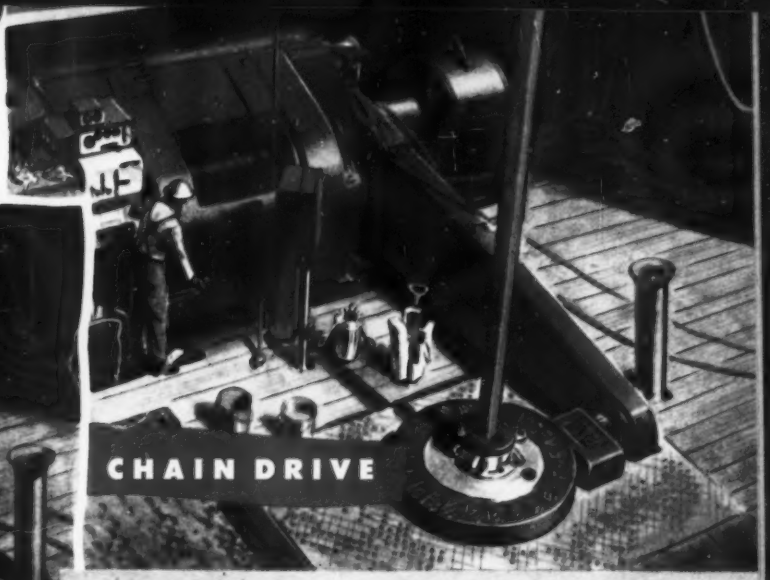
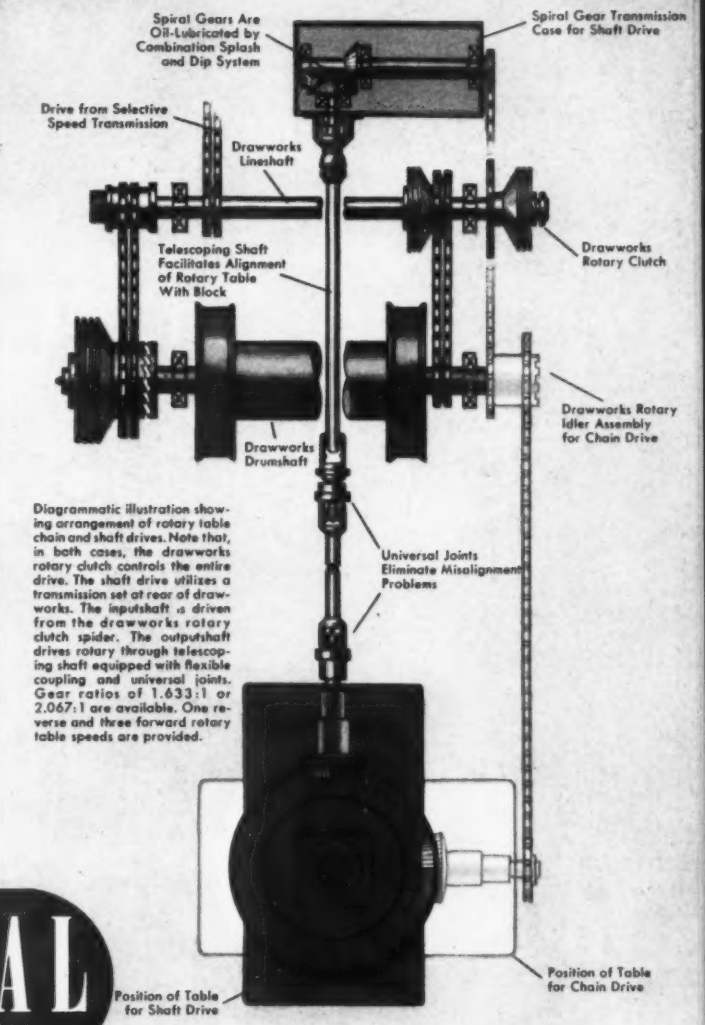


ANOTHER EXAMPLE OF THE *Versatility* OF EMSCO "J" SERIES DRILLING RIGS

Emsco "J" Series Drilling Rigs have been appropriately called the most versatile power rigs in the market. They offer installation and operating flexibilities that no other rig manufacturer can duplicate. Take the choice of rotary drives for example. All Emsco J-Rigs, new or old, can be equipped with either chain or shaft drives for the rotary machine. Emsco pioneered the development of totally enclosed, flood lubricated, streamlined rotary chain guards. They are the most successful guards of their type in the field. Their popularity is evidenced by their use with many makes of drawworks and rotaries. The Emsco rotary shaft drive arrangement used on Emsco J-Rigs is equally as popular with those who prefer to shaft drive their rotaries. Emsco J-Rigs now operating in the field may be quickly and economically converted from chain to shaft drives. You pick the drive best suited for your operations. And, for different locations, you can quickly change from one drive to the other. No compromise in operating efficiency need ever be made. This important operating versatility is found only with Emsco J-Rigs. Investigate this, and other important exclusive features of Emsco "J" Series Rigs—the most versatile power rigs in the market.


Spiral Gears Are Oil-Lubricated by Combination Splash and Dip System
Spiral Gear Transmission Case for Shaft Drive
Drive from Selective Speed Transmission
Drawworks Lineshaft
Drawworks Rotary Clutch
Telescoping Shaft Facilitates Alignment of Rotary Table With Block
Drawworks Rotary Idler Assembly for Chain Drive
Drawworks Drumshaft
Universal Joints Eliminate Misalignment Problems
Position of Table for Chain Drive
Position of Table for Shaft Drive

Diagrammatic illustration showing arrangement of rotary table chain and shaft drives. Note that, in both cases, the drawworks rotary clutch controls the entire drive. The shaft drive utilizes a transmission set at rear of drawworks. The inputshaft is driven from the drawworks rotary clutch spider. The outputshaft drives rotary through telescoping shaft equipped with flexible coupling and universal joints. Gear ratios of 1.633:1 or 2.067:1 are available. One reverse and three forward rotary table speeds are provided.

CONTINENTAL

ADV 557-50

THE CONTINENTAL SUPPLY COMPANY

General Offices: DALLAS, TEXAS • The Continental Supply Co., Limited, 216 Lancaster Bldg., Calgary, Alberta • *Export Division:* The Continental Supply Company, Inc., 30 Rockefeller Plaza, New York, N.Y.
Representatives: Argentina, Bolivia, Brazil, Chile, China, Colombia, England, Ecuador, Peru, Trinidad, Uruguay, Venezuela.

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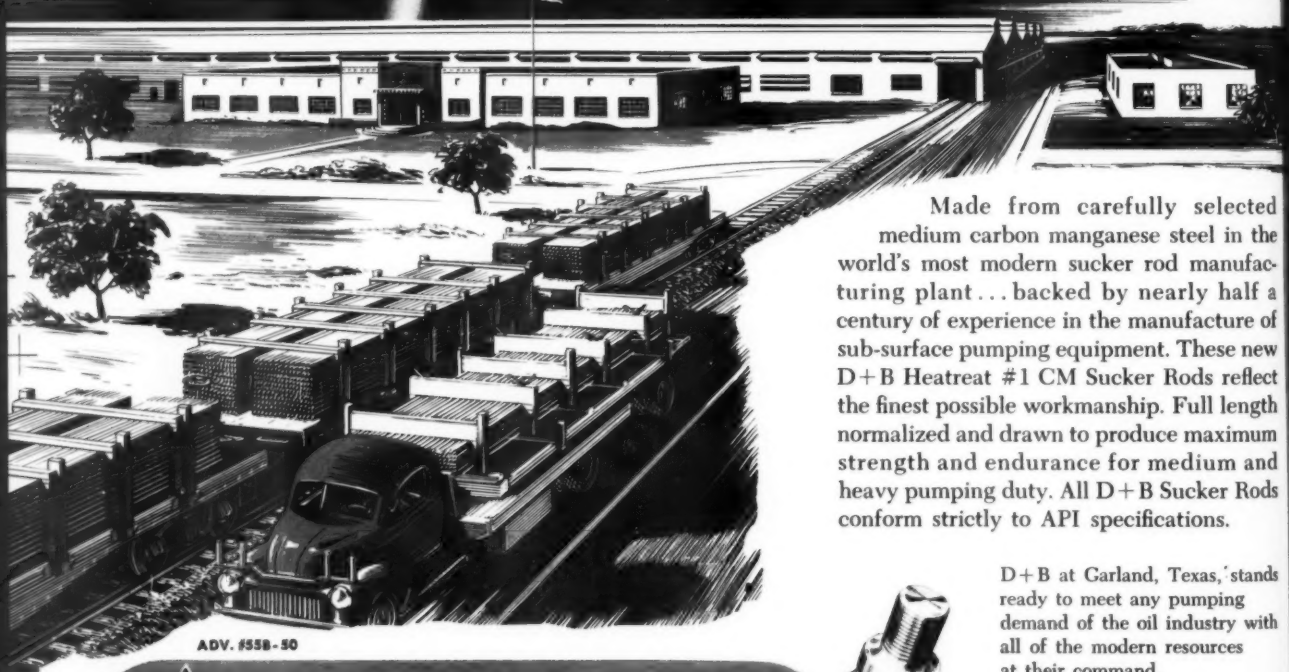

Made from carefully selected medium carbon manganese steel in the world's most modern sucker rod manufacturing plant... backed by nearly half a century of experience in the manufacture of sub-surface pumping equipment. These new D+B Heatreat #1 CM Sucker Rods reflect the finest possible workmanship. Full length normalized and drawn to produce maximum strength and endurance for medium and heavy pumping duty. All D+B Sucker Rods conform strictly to API specifications.

D+B at Garland, Texas, stands ready to meet any pumping demand of the oil industry with all of the modern resources at their command.

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It all started in 1892. That was the year Axelson began making better production equipment. The process continues to this day.

Your nearby Jones & Laughlin Supply store offers no substitutes for Axelson products—that's how sure we are of Axelson's ability to serve you efficiently and dependably. Our services to you are further enhanced by the maintenance of Axelson pump repair shops in many stores. NEVER junk an Axelson pump! Have our skilled mechanics overhaul it.

It's a wise habit to consult your Jones & Laughlin Supply store on all production equipment problems. Try it today.

Jones & Laughlin Supply Company

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EXPORT: 405 LEXINGTON AVE., NEW YORK, N.Y. U.S.A.

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LET PB TAKE THE WHIPPING!

YOU KNOW THE RESULTS of excessive vibration and whip in the fast line of your rig . . . how line wears out quicker because of uneven spooling and pile-up on the drum and unnecessary friction against the fast sheaves. *PB can save you money by taking the whip out of the wire line on any well you drill.*

NEW PB ROLLETTE WIRE LINE GUIDE

FOR ALL AVERAGE DEPTH DRILLING

8-POINT CONTACT! Eight rollers contact the line, stabilize it against damaging whip and vibration, and insure even line spooling on the drum.

ABSORBS WHIP! All line whip absorbed by the rollers is transmitted to the Rollette body and hanging assembly.

NON-CLOGGING! Rollers of solid, tough, field-proven PB rubber operate in an all-steel body designed so that rollers cannot clog or throw oil on the crew.

FREE SPINNING! Rollers are molded integral with heavy duty lubricated-and-sealed ball bearings that insure a free-running line at all times.

SAFE! Rollette design and construction are such that the rollers cannot, under any conditions, fall out of the body.

FOR YOUR DEEP DRILLING

use the PB Roliguide, especially built for the heaviest duty deep drilling operations. Handles 1⅛" wire line, has all the construction features you want for the toughest well conditions.

Your nearby PB representative has detailed information on the new PB Rollette Wire Line Guide, supplied complete as pictured, made to meet *most* of your drilling requirements. *See him today.*

Patterson-Ballagh

Division of Byron Jackson Co.

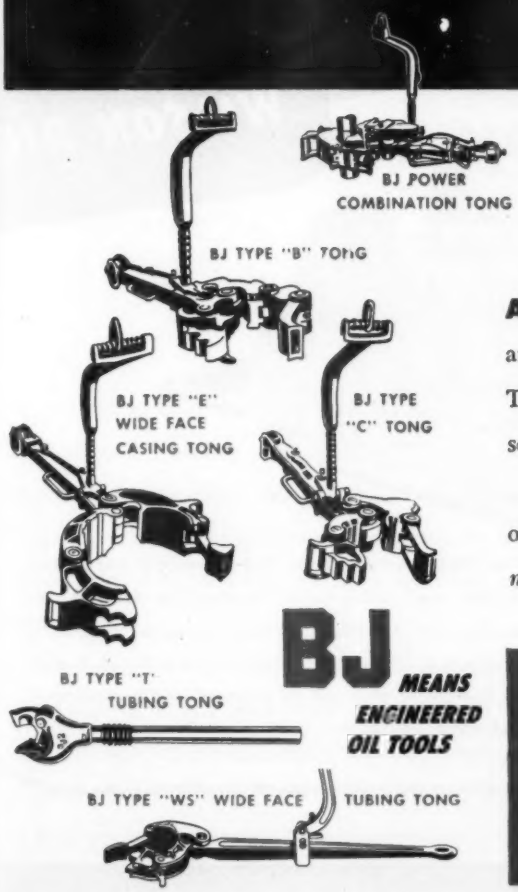
MAIN OFFICE: 1900 EAST 65th STREET

LOS ANGELES 1, CALIFORNIA

THERE ARE MORE BJ TONGS

WORKING ON THE WORLD'S DRILLING RIGS...

more than any other make!


BJ POWER COMBINATION TONG
BJ TYPE "B" TONG
BJ TYPE "E" WIDE FACE CASING TONG
BJ TYPE "C" TONG
BJ TYPE "T" TUBING TONG
BJ TYPE "WS" WIDE FACE TUBING TONG

BJ *MEANS ENGINEERED OIL TOOLS*

AND HERE'S WHY! *They're Tough*—Tough BJ Tongs are hard at it long after ordinary tongs are tossed in the sump. They're made for work. Trip after trip on well after well you've seen the same dependable sets of BJs go to work.

That's the kind of time and money saving performance oil men want in the tools they use. *And that's why more oil men specify and buy BJ!*

Byron Jackson Co.

Since 1872

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STOCKING JOBBERS ALL PRINCIPAL OIL FIELDS

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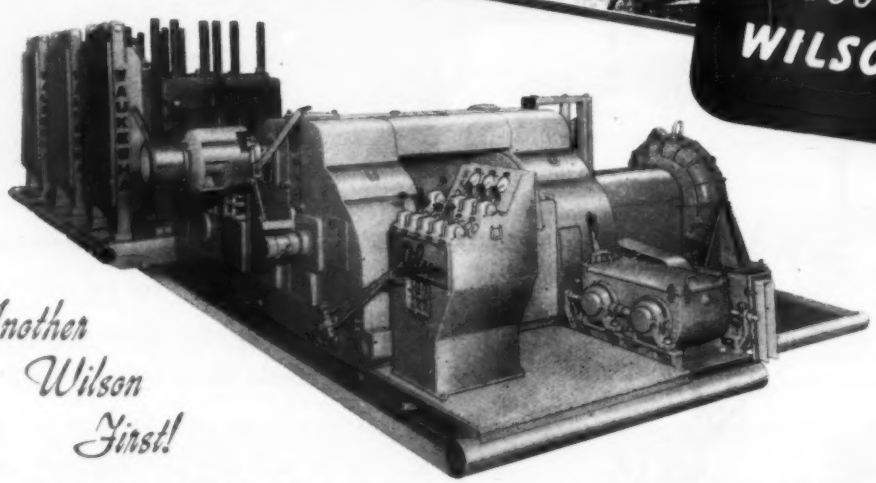

Another Wilson First!

The all new WILSON TORCAIR-ROADAIR RIG — the world's first rig to be designed for TORQUE CONVERTER DRIVE OR DIRECT ENGINE DRIVE. Completely new — from front to rear. It can be transported in one unit, or can be broken down into several smaller units. It contains Wilson Air-Tube Disc Clutches throughout, Full Pressure Water Cooled Brakes, and many other outstanding features, including the sensational Wilson Sectional Box Type Compound. The only rig with four Air Clutch Speeds on the Drum that can be changed while running — and under any load.

Wilson MANUFACTURING CO., Inc.
WICHITA FALLS, TEXAS

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The heavy duty detergent oil for tough lubricating jobs

Here's an oil that offers "behind-the-ears" cleaning action for power cylinders in oil field pumping units — Gulflube Motor Oil H. D. It helps keep valves and rings clean and free—prevents formation of harmful deposits on internal engine surfaces.

Gulflube Motor Oil H.D. is a quality heavy-duty detergent oil, performance proven in thousands of automotive, industrial, and marine engines. It's the ideal oil for tough lubricating jobs.

You get an important plus value when you use Gulflube Motor Oil H.D.: the helpful counsel of Gulf Lubrication Engineers, specialists in scientific gas engine lubrication. Write, wire, or phone to:

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A few Ashcroft "firsts" that have anticipated the needs of industry:

1921—Ashcroft introduces the micrometer adjustable pointer.

1924—The rotary movement is announced by Ashcroft.

1929—The phenol condensate plastic case is an Ashcroft "first" this year.

1932—Bourdon Tubes of stainless steels are announced by Ashcroft research engineers.

1936—Stainless steel movements, for greater service life, join the long list of Ashcroft Gauge features.

1939—"K" Monel Bourdon Tubes, for services that would corrode stainless steel, introduced by Ashcroft.

1939—Laminated phenol dials make this year a big one in Ashcroft development.

1947—Ashcroft research engineers announce the new, revolutionary Nylon Movement*.

**Pat. applied for.*

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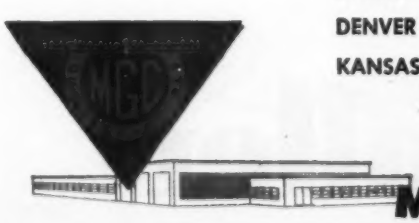
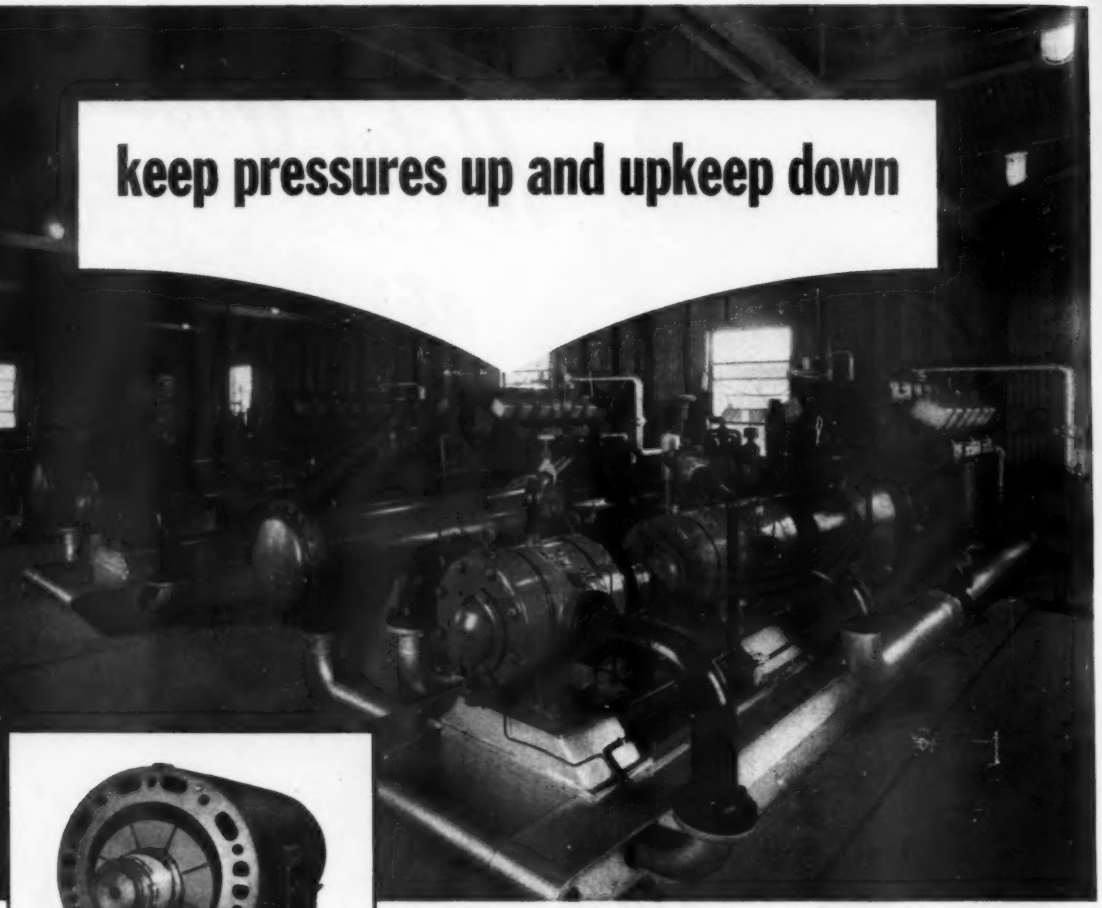
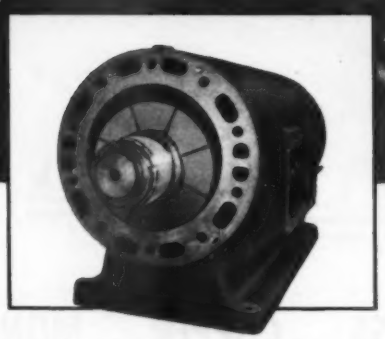
*Not warehoused in Kansas City or St. Louis.



METAL GOODS CORPORATION

keep pressures up and upkeep down





Three two-stage Natural Gas Boosters in operation near Stinnet, Texas. Each direct-driven by a gas engine at 800 rpm., handles 1,770,000 SCFD, and boosts pressure from 10 to 120 psig.

Once again, Fuller Rotary Compressors have been chosen to give natural gas a king-sized boost. Texas gas men know when they install a Fuller Compressor that upkeep is low . . . that they'll get a life-time of dependable, continuous service.

There are no valves or other complicated mechanism in a Fuller Rotary Compressor. Moving parts—rotor, bearings, and blades—are few. Vibration-free, pulsation-free, and free from bearing take-up! Blades automatically compensate for wear, thereby insuring full compressor capacity for the life of the machine. It all adds up to one of the simplest and most efficient compressors available.

Fuller engineers are ready to offer estimates and plans for any compressor installation, whether for gathering lines or for general booster work. Write for Bulletin C-5 for complete information on Fuller Rotary Compressors.

FULLER COMPANY, Catasauqua, Pa.
120 So. LaSalle St., Chicago 3
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C-207

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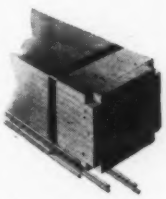
use the best!



"OXWELD" HIGH QUALITY RODS...all kinds

No. 1 H. T. Steel
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No. 28 (Pat.) Columbium-Bearing Stainless Steel
No. 32 CMS (Pat.) Steel
No. 7 Drawn Iron (Copper Coated)
No. 25M Bronze
No. 25M (Pat.) Flux-Coated Bronze
No. 31T (Pat.) Bronze
No. 19 Cupro
No. 26 Everdur Bronze
Tobin Bronze
No. 23 Drawn Aluminum
No. 14 Drawn Aluminum
No. 9 Cast Iron

HARD-FACING RODS

Haynes 90 Iron-Base
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Haynes 93 Iron-Base
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"OXWELD" FLUXES...for all welding jobs

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"OXWELD" HOSE...highly resistant to abrasion, sun checking, and weathering. Light, flexible, and durable. Corrugated finish.

3/16-in. 1-Braid Oxygen
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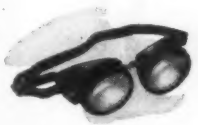
1/4-in. 2-Braid Oxygen
1/4-in. 2-Braid Acetylene
3/8-in. 2-Braid Oxygen
3/8-in. 2-Braid Acetylene
3/16-in. 1-Braid Rayon Fitted Hose
1/4-in. 1-Braid Rayon Fitted Hose
1/4-in. 1-Braid Double Hose (Two lines of highest quality, molded side by side into a single unit.)

"OXWELD" GOGGLES...provide maximum eye protection for all oxy-acetylene jobs.



No. 16, adjustable eye cups shaped to fit comfortably.
No. 17, for wear over ordinary eyeglasses.
Special flatground, polished lenses conform to all safety codes.

We have these **OXWELD** welding supplies, too . . .

Tip Cleaners
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Wire Brushes
Leather Gloves, suede
Cotton Gloves, flame-resistant
Hose Connections
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When it comes to oxy-acetylene apparatus, we have it, too! Contact your Linde office or Linde's local jobber.

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The terms "Linde," "Oxweld," "Brazo," "Ferro," "Cromaloy," "Haynes," "Haynes Stellite," and "Hascrome" are trade-marks of Union Carbide and Carbon Corporation or its Units.

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Cut your costs with this *pre-hardened!*

"100% increase in machinability at 300 Brinell"
"easy drilling and tapping at 340 Brinell"
Heres what users say about
U·S·S Carilloy FC
free-cutting alloy steel
"lower handling and heat-treating costs"
"lowered over-all costs"
"has increased production"

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free-cutting Alloy Steel

U·S·S Carilloy FC

AVAILABLE QUENCHED AND TEMPERED, FROM 255 TO 375 BRINELL

DO you manufacture heavy-duty shafts, gears, axles or other heavily-stressed parts that demand high hardness and strength? If you do, Carilloy FC steel can end a lot of your heat-treating and machining headaches.

U·S·S Free-Cutting Carilloy FC is a deep hardening Mn-Cr-Mo steel, already quenched and tempered to the hardness you require. You don't have the expense of heat-treating after machining, and you eliminate rejects caused by distortion and scaling.

Users of Carilloy FC steel say that it increases tool life remarkably. Life increase figures go as high as 300%. This substantial savings in tool cost, coupled with the often marked savings in production time, adds up to an over-all reduction in costs that's hard to beat with *any other steel* that has comparable hardness and strength.

U·S·S Free-Cutting Carilloy FC is available in bar form, quenched and tempered *or* annealed, in all sizes of rounds from ⅝″ to 8-⅛″ diameter.

Here's the clincher: Carilloy FC steel costs only a *fraction of a cent* more per pound than ordinary, thorough-hardening alloy steels. If your job requires forging, we can also furnish a complete range of Hot Rolled Bar and Semi-Finished sizes.

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH
COLUMBIA STEEL COMPANY, SAN FRANCISCO
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Carnegie-Illinois Steel Corporation
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Please have a representative call to discuss U·S·S Free-Cutting Carilloy FC.

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Company.....

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Compressed Asbestos Sheet Packing

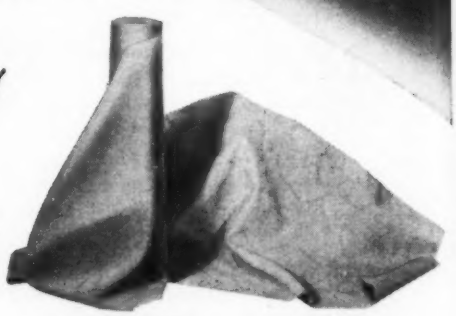
Superior Performance

Top performance is the result of ability, experience and extra effort. GARLOCK Sheet Packings are superior gasketing materials because of careful selection of raw materials, experienced workmanship and constant quality control.

GARLOCK 7021 Compressed Asbestos Sheet is exceptionally strong and tough. Gives superior service against gasoline, oil, gas or steam at high temperatures and extreme pressures.

GARLOCK 22 Red Rubber Sheet Packing is tough and resilient. Specially recommended for hot or cold water and low pressure steam joints.

GARLOCK 660 Cork-Fibre Sheet Packing combines granulated cork and vegetable fibre into a strong compressible sheet; treated with an oil resistant binder. An ideal gasketing material for oils and solvents at temperatures up to 212°F.



GARLOCK 22 Red Rubber Sheet Packing

GARLOCK 660
Cork-Fibre
Sheet Packing

THE GARLOCK PACKING COMPANY
PALMYRA, NEW YORK

Tulsa, Okla. Houston, Tex.
Los Angeles, Calif.

GARLOCK SHEET PACKINGS

They Say—

Price Policy

"Our experience of more than 20 years in selling gasoline in 18 states indicates the wisdom of promptly meeting such price competition before it gets a foothold and becomes ruinous.

"Not to do so is to assure the profitability of the price-reducing competitor's business. This is the way it works: Even though the price cutter's margin may be less than that of dealers who do not lower prices, his net profit may be greater by reason of the fact that he is selling more gallons of gasoline. As his gallonage goes up, his cost of handling each gallon comes down. At the same time, dealers who are holding fast their prices immediately suffer reductions in profits by reason of the fact they are selling fewer gallons and as a result their cost of handling each gallon goes up. This process can repeat itself, as we have seen.

"Efficient dealers, with help from their suppliers, should be able to sell as low and as long as their competitors. Experience has demonstrated to us that when such competition becomes unprofitable for all concerned it stops. But experience likewise indicates that such competition goes on as long as the competitor reducing prices can make a profit from such operations. In other words, where in these past situations dealers promptly met price cutting competition, they ultimately forced a return to a price level that was profitable for all efficient dealers. And experience likewise has shown that where dealers undertake to sit tight and hold prices unchanged, the price-reducing competitor expands his business at their expense."

Willard J. Wright, general sales manager, Sun Oil Co., in letter to New Jersey dealers commenting on the gasoline price war in that state.

German Oil

"The German crude-oil production, which is based on the oil deposits in the Hannover-Brunswick, in the Holstein-Hamburg area, and in the Emsland, is now in a state of rapid development. Extensive geological and geophysical research work has led to the discovery of important oil reserves; new commercial oil fields have been taken into production, pipe lines have been built, and crude-oil refineries erected. In March 1950, the German crude-oil output exceeded the figure of 90,000 tons per month for the first time.

"In the course of this year, Germany will reach an output of more

Dependable FIRE PROTECTION...

STARTS WITH ANSUL water-tight CONSTRUCTION

CUTAWAY VIEW, ANSUL MODEL 20-B

The new, improved Ansul Model "B" Extinguishers have the greatest fire-killing ratings* ever attained by hand portable fire extinguishers. In addition, WATER-TIGHT CONSTRUCTION, (exclusive with ANSUL) has resulted in far greater dependability than any other dry chemical extinguisher.

In fire protection equipment, the best is none too good. Accordingly, Ansul engineers conduct continuing research for improving Ansul Extinguishers and Dry Chemical. Ansul Quality has set a high standard for newcomers in the dry chemical fire extinguisher field. This unparalleled standard of quality is constantly being raised by Ansul research and development.

Send for File No. 615. You will receive a variety of helpful printed matter. Included is our latest catalog which describes Ansul Extinguishers of all sizes — from the small Ansul Model 4 to Ansul Piped Systems and Ansul 2000 lb. Stationary Units.

*Factory Mutual Laboratory Reports of Examinations and Tests.

Exclusive Features

- Patented Nozzle assures most effective stream pattern . . . Best results by inexperienced operators.
- Special packings in Nozzle and other parts exclude water.
- Corrosion resistant construction throughout.
- Easy on-the-spot Recharging (No tools needed).
- Quick, *positive* puncture operation.
- Special cartridge guard protects cartridge . . . rugged construction throughout.
- Ansul *"PLUS-FIFTY"* Dry Chemical used exclusively.
- Field tested by thousands of satisfied customers.

ANSUL CHEMICAL COMPANY
FIRE EXTINGUISHER DIVISION
MARINETTE • WISCONSIN
DISTRIBUTORS IN ALL PRINCIPAL CITIES IN THE U. S. A., CANADA AND OTHER COUNTRIES

"PLUS-FIFTY" DRY CHEMICAL IS MORE DEPENDABLE ALL-WAYS!

THIS TRADE MARK ASSURES YOU OF QUALITY PRODUCTS

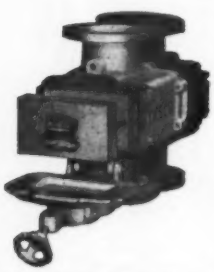
Specify

OCECO TANK FITTINGS

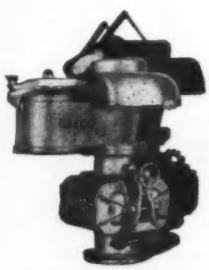
FOR EFFICIENT *Fire-Safe*

TROUBLE FREE OPERATION

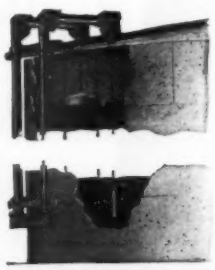
● Although used in all parts of the world—under all kinds of conditions—flame has never entered a tank equipped to Oceco specifications. Get Oceco's proven, dependable protection for your tanks too. It costs only a fraction of one percent of the value of the tank and its contents. Send for the Oceco data sheets. They give complete details. *Write today.*



TYPE "E" FLAME ARRESTORS can withstand long exposure to fire. The "banks" have vertical straight through passages — minimizing entrainment and pressure drop, and are "extensible" for easy cleaning. 2" to 10" sizes.

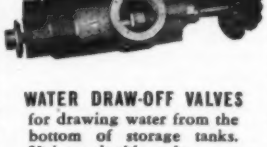


TYPE "BE" VENT UNITS consist of a V-113 Vent Valve with snuffer, mounted on a Type "E" "Extensible" Bank Flame Arrestor. 2" to 10" sizes. Unsurpassed for efficiency and reliability.



LIQUID LEVEL INDICATORS AND GAUGES — wide variety of types for roof or on the ground readings of cone, umbrella, floating, or expansion roof and spheroid tanks. Pressures ranging from 0 to 125 lbs. per sq. in.

V-108 EMERGENCY PRESSURE RELIEF VENTS provide instant relief for excessive internal pressures, resulting from exposure fires, etc. Furnished in 6", 8", 10", 15¼" and 20½" sizes.



WATER DRAW-OFF VALVES for drawing water from the bottom of storage tanks. Unique double valve construction permits the valve chamber to be drained to prevent freezing, and the working valve serviced without emptying tank. 2"x1½"; 3" x 2" and 4" x 3" sizes.

V-114 INTERNAL TANK VALVES are provided with a fusible link that melts when subjected to fire, closing the valve instantly, and cutting off the flow. 3", 4", 6", 8", 10", 12" and 16" sizes.

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than 1 million tons and will thus join the other oil countries of international reputation. Although the German crude-oil production represents a comparatively small share of the world's crude-oil production, it is by no means of subordinate importance for the German industry. Already in 1949, about the third of Germany's total mineral-oil demand was covered by the German output. This share will still increase, when the German crude oil production has reached the 2-million-tons goal in the years to come, owing to the intensive geological and geophysical research work and the huge exploratory activity of all the oil companies engaged in Germany."

Dr. Heinrich Hassmann, Hamburg, author of a new book, "Crude Oil in Germany."

Gas Regulation

"Sound, sensible, and equitable regulation of certain industries affected with a public interest is the greatest bulwark we have against government ownership of those industries. Throughout the world, government ownership of utilities has been the cornerstone of every socialistic state. Therefore we consider it as much our task as yours to see that your industry continues as private enterprise. This is the primary role of regulation.

"For some reason, many people have developed an unrealistic attitude toward gas rates and gas service. They do not accept the theory that there is a direct relationship between cost and service and that economic conditions which affect the cost of other commodities also affect the cost-of-production of utility services.

"Some appear to expect a regulated utility to operate in defiance of economic conditions, and many have not learned that poor gas service follows inadequate rates. Regulation should expect and require management to provide the best possible service with the funds provided by the rate payer. It should not expect the impossible. Regulation can not expect limousine service on a wheelbarrow income."

Owen Clarke, chairman of the Washington Public Utilities Commission, before the Pacific Coast Gas Association, Seattle.

MPAB Commended

"It is a pleasure and duty to commend the petroleum industry for its foresight and devotion to the cause of national security as exemplified by the Military Petroleum Advisory Board. This group is composed of 300 industry representatives, and it serves a liaison function with the military planners. For 3 years this board has been studying the problems implicit in such an international crisis as the Korean fighting today has in world-wide focus. . . .

"The Military Petroleum Advisory

Board also serves the enlightened self-interest of the oil industry and of the American business system. If war should come, the oil industry would manage its affairs on the basis of experience, efficiency, knowledge, and social responsibility. Private enterprise can do it best."

Bulletin of Guaranty Trust Co., New York.

Canada and Synthetics

"Had it not been for the great new oil potential of western Canada, there would be public advocacy today for the creation, as a measure of strategic military security, of a synthetic-fuels capacity based on coal and oil shale. The economic prospects for synthesis plants obviously depend on the availability and price of crude oil. Creation of such capacity would entail large amounts of steel and big capital investments, aside from the time-consuming task of designing and constructing the facilities. . . . It would seem that the prospect for synthetic-fuels plants in this country, as commercial or wartime security ventures, has been deferred for some years."

Bulletin of Guaranty Trust Co., New York.

Tideland Muddle

"The tidelands issue is still one of the big problems which Congress must eventually settle. Eventually, either the claims of the state must be sustained or the claims of the federal Government must be implemented by legislation.

"The recent Supreme Court decisions in the Texas and Louisiana cases have not clarified, but have only further confused the issues. Largely because of these decisions, neither the states nor the federal Government, nor the lessees in the disputed areas know just what their rights are. . . .

"Unless some agreement can be reached a great deal of fur is going to fly. . . ."

Rep. Ed Gossett of Texas in the Amarillo News-Globe.

Likes Our Features

Sir:

. . . I want to add a word of approval to the column "Journally Speaking" which lends much of interest, and the concise page giving highlights of the week's developments. I find myself turning to them first and then when time permits, reading the longer articles.

The reporting, including maps on the developments in West Texas, have been particularly well done. Really a swell magazine.

U. R. Laves,
Petroleum geologist,
Oklahoma City, Okla.

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FIRST CHOICE

AXELSON Deep Well Plunger Pumps deliver more oil at less lifting cost with less down time. There is an Axelson Deep Well Plunger Pump for every specific well condition.

AXELSON Sucker Rods backed by 56 years of factory know-how, are duty designed, service proved under every well condition, making them "First choice" in the Petroleum production field.

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PELTON Jacks are available in 7 models with polished rod load ratings from 20,000 to 40,000 pounds. Stroke lengths 20, 25 and 30 feet.

OIL PRODUCTION DOUBLED* WITH PELTON LONG STROKE Hydraulic Pumping Jacks

PRODUCTION CALCULATIONS
SHORT STROKE VS PELTON LONG STROKE
Equal Polished Rod Travel

	Short Stroke	Long Stroke
Upward Polished Rod Travel	740 in. per min.	740 in. per min.
Surface Stroke Length	74 in.	360 in.
Strokes per Minute	10	2.05 (A)
Pump Setting	8400 ft.	8400 ft.
Bottom Hole Pump Plunger Diameter	1¾ in.	1¾ in.
Acceleration Factor (Mills Formula)	1.104	1.021
Peak Polished Rod Load	26,437 lbs.	24,986 lbs.
Maximum Stress in Top Sucker Rod	33,677 psi.	31,829 psi.
Sucker Rod Stretch	54 in.	54 in.
Bottom Hole Pump Plunger Overtravel	10 in.	2 in.
Net Bottom Hole Pump Plunger Travel	30 in.	308 in.
Per Cent Surface Stroke LOST through Sucker Rod Stretch after Correction for Overtravel	59.5%	14.5%
Production in Barrels per Day at 100% Bottom Hole Pump Volumetric Efficiency	107	225 (A)

* Increased production due to the long surface stroke equals $\frac{225}{107} \times 100 = 210.2\%$

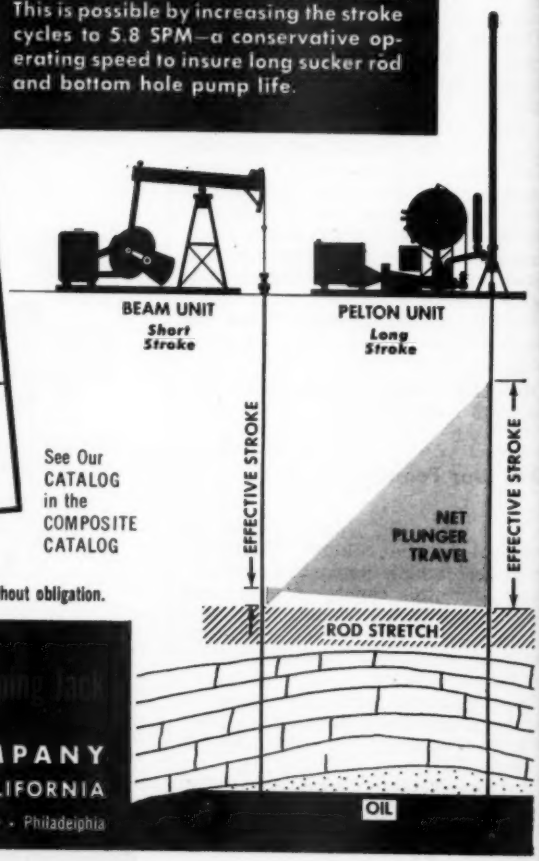
Above calculations based on using a tapered 1", ⅞" and ¾" Sucker Rod String, 10° API gravity fluid, fluid level at the Pump.

NOTE (A): The 360" stroke Hydraulic Unit may be operated at 5.8 SPM increasing the production to 669 B/D if required, while maintaining satisfactory sucker rod stresses.

IT'S THE EFFECTIVE STROKE THAT COUNTS

The table illustrates how the Hydraulic Long Stroke can double production through minimizing the effect of rod stretch.

As can be seen from note "A," a still further increase in production may be realized with the PELTON Jack without overstressing the sucker rods. This is possible by increasing the stroke cycles to 5.8 SPM—a conservative operating speed to insure long sucker rod and bottom hole pump life.



See Our CATALOG in the COMPOSITE CATALOG

SEND FOR APPLICATION DATA SHEET. Complete recommendations furnished without obligation.

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THE PELTON WATER WHEEL COMPANY

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EFFECTIVE STROKE

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JOURNALLY Speaking

Rube Goldberg

OH boy, have we gone all out on the cartoon business. The endorsement of the little cartoon we have been running in the back of the book was so encouraging that we went whole hog and signed on the one and only, inimitable Rube Goldberg. We are running Goldberg's weekly brain storms up front with the news because his cartoon is about the news of the week, or at least he says it is.

We can't claim that Rube is a member of our staff. His drawings are syndicated and a few of you may see them in your hometown newspapers also. But we hope you will get the habit of looking for them in The Big Yellow Book.

Neither do we pretend that these sketches have anything to do with the oil business. What appealed to us was the ingenious mechanical devices portrayed. That's why we introduced the first one last week over a "Technology" cutline. Most of our readers are engineers or have to do with mechanical equipment and cause and effect, so we figured that Rube was right down their alley and they would get a kick out of him.

Rube Goldberg, as almost everyone should know, made fame and fortune with his goofy inventions, bizarre statues, and similar utterly incongruous and impossible drawings. His name became a household word and is still a synonym for an odd mechanical contraption. Then he decided to turn to higher things, dropped his inventions cold, and devoted himself to serious political cartooning. He did so well at this that he won a Pulitzer prize. But his suppressed mechanical genius cried for an outlet, so he is now putting it to work discovering a cause-and-effect relationship in the news events every week.

Putting a Goldberg cartoon in our staid publication was such a reversal of form that many members of our staff could hardly swallow it, so a compromise was reached. The cartoon will continue only if we have evidence that a goodly portion of our readers want it continued. If their time is too valuable to waste on such nonsense we will devote the space to technical dissertations on reservoir engineering or refinery operation.

We thought we might run a readership survey on Rube, but it may not be necessary. The very day one Texas subscriber received last week's issue he voluntarily wrote us: "Please put one affirmative vote in the ballot box for Rube Goldberg. The fact that I'm a geologist has nothing to do with my vote."

We hope the rest of you readers feel the same way.

SNAFU

ONE of our staff men, who apparently had not much else to do, expressed surprise at the name of Platte Pipe Line Co. selected for the big crude line to be built from Wyoming to St. Louis He said that when the British American, Continental, Ohio, Pure, and Sinclair companies got together to christen the line they should have worked out a combination of their firm names like BACOPS.

Which reminded us of a recent article about LESOCUPETHY, which is a new social science invented by a Yale professor and christened by him with letters selected from "learning, society, culture, and personality theory." Following along with this idea, we figured that FAVOLPUB (our favorite oil publication) might contribute to the vocabulary of the industry by popularizing NAGALIQ as an all-inclusive and headline-fitting term for liquefied petroleum gas and other light hydrocarbons produced from natural gas, or maybe GEPHYSMOPAL for all types of oil exploration based on geology, geophysics, seismology, paleontology, and related earth sciences.

But we decided against it because it began to sound too much like Navy jargon and we were afraid our readers would conclude that we were NOCOMPTIS, meaning non compos mentis.

—Henry D. Ralph

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DOWELL PERFO-JET SERVICE . . . An improved, more effective method of perforating casing and open hole shooting

Dowell Perfo-Jet Service offers you a bonus beyond a better means of oil well perforating. Dowell Perfo-Jet Service is conducted from Electric Pilot Service trucks, engineered and built by Dowell. This proved equipment incorporates the latest scientific instruments designed to do the job *accurately*, effectively, quickly. Also, the other Pilot Services—Caliper, Water Locating and Permeability Surveys—may be correlated with Perfo-Jet to improve the possibilities of a successful completion.

The high velocity gas jets of Dowell Perfo-Jet Service are used to give deeper, more definite penetration of casing, cement and formation . . . to increase the drainage area of tight wells completed in the open hole . . . and to increase the effectiveness of acid and other well treating chemicals by providing entry channels.

Nearly two decades of experience in oil field service have given Dowell the familiarity with well conditions and problems that is essential to good service. For more effective perforating, call Dowell Perfo-Jet Service.

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Ask your nearest Dowell station for complete information on these Dowell Services and products: Acidizing Service, Electric Pilot Services, Plastic Service, Chemical Scale Removal Service for heat exchange equipment, Jetflake, Paraffin Solvents, Magnesium Anodes for Corrosion Control and Bulk Inhibited Hydrochloric Acid.

"Petroleum Promotes Progress"

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FOR OIL INDUSTRY CHEMICAL SERVIC

the OIL AND GAS JOURNAL

VOL. 49, NO. 18 SEPTEMBER 7, 1950

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No wonder it is called "the most VERSATILE* tool in the oil business"

**Webster's Dictionary defines as, "Turning with ease from one thing to another; having an aptitude for new tasks."*

Although we know of literally dozens of different types of jobs that have been performed with the Baker Model "K" Cement Retainer and Casing Bridge Plug (Product No. 400) there are probably an equal, or greater number of "new tasks" which have not come to our knowledge.

It is easy to generalize and list the uses of this truly remarkable device for placing and squeezing cement; placing and squeezing plastics; acidizing; testing; as a bridge plug; and as a fishing tool. But think of the endless variations of these applications, and you will understand why a Baker sales and service engineer had the following to say in an address made to his fellow field workers:

"Certainly I'm enthusiastic about the Baker Cement Retainer—in fact I am *excited* about it! Has any other tool in the oil business successfully solved so many problems? Has any other tool accomplished more? I think not.

"I have seen liners screwed on the bottom of this Retainer, run in the well and cemented. I have seen it set in liners, and the liner run in the well and cemented. I have seen it set between perforations, and cement circulated behind the casing; and I have seen it set in parted strings of casing, the casing picked up, and cemented back in place.

"It has been routine to place plastic in a well with the Baker Model "K" Cement Retainer for the purpose of reducing high gas/oil ratios. Its use has been routine for the purpose of consolidating sands, and plastic has been pumped through it for repairing breaks in casing. But there are many other variations. Not only has a one-zone acid job been done with this tool, it has been used for acidizing two zones. Not only have these zones been acidized, but the well has been brought in through the tool, and a test made. Not only has a test been made through the tool after acidizing, it has been left in the well and used as a production packer! I have helped in its being set above perforations, the well brought in by swabbing or circulating water, a test made; and when the water/oil, or gas/oil ratio was too high, a squeeze job performed through the retainer.

"Has its use been confined to the setting in casing? Not at all; it has been successfully used in open hole.

"In addition to these few applications mentioned, the Baker Model "K" Cement Retainer can be used as a bridge plug! Has any other tool in the oil business successfully solved so many problems? Is any other tool so versatile? I think not. What is its future? What will be the future problems encountered in drilling and producing oil wells; what will be the future problems of secondary recovery; what will be the future problems in remedial work? What new media will be used for cementing, plugging, consolidating and acidizing? I am certain that the solutions to these problems will involve the use of the Baker Model "K" Cement Retainer and Casing Bridge Plug, and improvements and adaptations of it."

ABOVE Construction details of "Cement Retainer" equipped with Junk Pusher.

LEFT Baker Cement Retainer, with Circulation Joint and Control Unit, to provide "versatility".

RIGHT Baker Retainer "Bridge Plug" with Wire Line Pressure Setting Assembly.

The Baker Junk Pusher has slots which permit passage of displaced fluid, but prevent passage of junk or debris which might foul the slips.

NOW RUN AND SET ON AN ELECTRICAL CONDUCTOR CABLE

Since the above address was delivered, and as if to justify this man's predictions of the future, we have developed a method for setting this efficient device as a Casing Bridge Plug when run on an electrical conductor cable. This application is available through several leading service organizations having trucks equipped with all necessary accessory equipment to set the Baker Model "K" Retainer Bridge Plug, Product No. 400-D, accurately at the desired depth, to provide a positive, leak-proof bridge plug which prevents movement of fluid or gas either up or down the well. The "Cast Iron" type Bridge Plug is recommended for permanent installations; the "Magnesium Alloy" type for use as a temporary bridge plug. The former type is designed with easy drillability in mind (even to segmented slips which break up readily); while the "Magnesium" Bridge Plug represents the ultimate in easy drillability.

Complete descriptions, illustrations and specifications are in the Composite Catalog, as well as the separate Baker Catalog gladly sent to any oil man upon request. Inquiries to any Baker Office or representative will receive prompt and courteous attention.

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Behind the Lines

There is more than routine significance in last week's announcements that plans are well advanced for the construction of two big new crude-oil pipe lines, one from Wyoming to the Mississippi River and one from West Texas to southern California.

For several years there have been three major areas in North America where potential crude-oil production was greater than local consumption plus the capacity of pipe-line outlets to consuming regions. These are the Canadian prairie provinces, the Rocky Mountain region, and the Permian basin of West Texas and New Mexico.

Now the Interprovincial line from Alberta to the Great Lakes is under construction and will be in service next year. The Platte line from the Rockies eastward has been launched and should be completed in a year or so. The West Coast line is still in the planning stage but is being pushed actively again after several years of discussion.

These multimillion-dollar projects show that the oil industry can take care of its transportation needs without subsidy or direction from the Government. They show that the industry is forward looking, planning far ahead for the needs of consumers and of national defense.

Such projects also show how inherently integrated the oil industry is and must remain if it is to progress. While these lines are common carriers and will serve all who have crude to ship, they are being promoted and financially underwritten by the big producers in each area of origin. It is extremely doubtful that any one of these lines would be built as an independent enterprise which would have no guarantee of adequate traffic such as can be given only by producer-owners.

Interprovincial is sponsored by a single major company; Platte by five competing firms; West Coast by 50 independent producers. But in each case there is the same basic and beneficial principle of integration: A project is built primarily as a plant facility and to make other parts of the owner's operations function more economically, but it results in serving the entire industry and the national economy.

Development of production and promotion of pipe-line outlets must go hand in hand. One can not go far without the other, and if the two are not integrated through common interests there will be waste and delay. These three pipe lines are being promoted so that the sponsors can sell their own oil and develop their own properties. But in each case they stimulate exploration and drilling by others, thus increasing the nation's reserves and producing capacity and advancing the economy of the regions they serve.

If integration were prohibited by law these three pipe lines would not be built; exploration and drilling in the three areas would be retarded; and the nation would lack the producing capacity and transportation facilities it may sorely need for national defense.

XUM

THIS WEEK

WASHINGTON—ECA order on price of Middle East oil in Europe may upset world crude-price schedules and tanker rates. . . . ¶State Department bulletin says British controls on sterling exchange still hamper world trade and sales of dollar oil. . . . ¶New legislation aims to untangle oil rights to farm lands sold by federal agency.

OUTLOOK—Bureau of Mines estimates that demand for the second half year will be about 8 per cent higher than in 1949. . . . Crude production seen heading for new peak. . . . ¶World crude markets will soon feel effect of Tapline which will start delivering Middle East oil to the Mediterranean early in December. . . .

INDUSTRY—Sponsors of Platte pipe line reveal right-of-way surveys are already in progress for crude line from Rockies. . . . Expect completion of line in 12 to 18 months. . . . ¶Champlin Refining Co. wins decision that its products line is not a common carrier. . . . ¶Work will start soon on North Snyder natural-gasoline plant, including isobutane unit. . . .

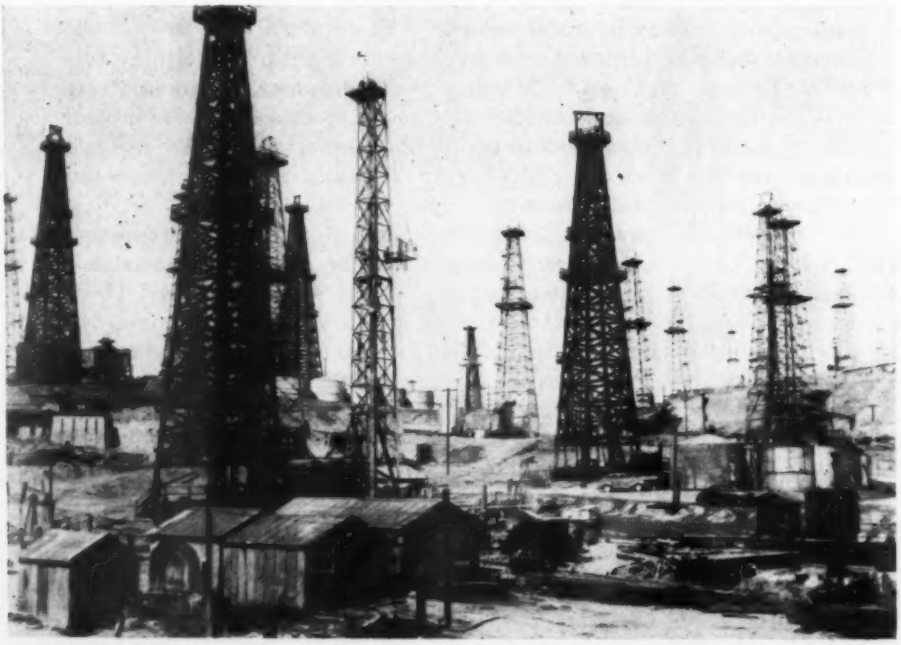
TRENDS—For the 5-week period ended August 26, demand for gasoline at refineries was 10 per cent greater than in the same weeks last year. . . . Total kerosine demand was up about 36 per cent. . . . Distillate demand gained 20 per cent. . . . Demand for residual, domestic and imported, was up about 13 per cent. . . .

INTERNATIONAL—Increase expected soon in exploration and drilling activity in Venezuela, now at routine levels. . . . Four Venezuelan operators to make joint seismograph survey of Lake Maracaibo. . . . Creole sets new production record. . . . ¶Gulf subsidiary obtains exploratory concession in Sicily. . . . Big increase planned in Italian L.P.G. industry. . . . ¶Mexico reports 70 rigs operating, 10 more to start soon. . . .

ACTIVITY—Crude production for week ended September 2 averaged 5,681,925 bbl. daily, up 56,250 bbl. daily from previous week and 926,275 bbl. daily from same week last year. . . . ¶Well completions for the week totaled 832 compared with 907 for previous week. . . . Wildcat completions gained 1 well over previous week to 155. . . . ¶A total of 2,209 rotary rigs were operating in United States on August 28 compared with 2,227 a week earlier and 1,962 on same date in 1949. . . .

REFINING—Refinery runs have averaged better than 6,000,000 bbl. daily in each of the past 3 weeks, reaching all-time peak of 6,197,000 bbl. daily for week ended August 26. . . . Bureau of Mines revises estimates of demand for all products in fourth quarter to 6,970,000 bbl. daily. . . . ¶Another strike possible at Texaco's Port Neches, Tex., asphalt plant as C.I.O. oil-workers union serves 60-day notice of dispute. . . . ¶Louisville Refining Co. to install 3,000-bbl. daily U.O.P. catalytic cracking unit at its 6,000-bbl. refinery at Louisville. . . . ¶New Division of High Polymer Chemistry created by American Chemical Society. . . .

PIPE LINES—Humble Oil & Refining Co. to increase capacity of its West Texas-Houston crude-oil pipe line by 20,000 bbl. daily, to a total of 104,000 bbl. daily. . . . Humble Pipe Line Co. now in process of completing extension of facilities which will provide outlet to Fort Chadbourne area, Runnels County, Texas. . . . ¶Interprovincial Pipe Line Co. nearing completion on construction of 450-mile Edmonton-Regina section of its Alberta-Great Lakes crude-oil line. . . . ¶Kansas-Nebraska Natural Gas Co. authorized to expand its pipe-line system to handle 146,000,000 cu. ft. of gas daily. . . . ¶Laterals are planned by Texas Illinois Natural Gas Pipeline Co. and outside interests in connection with 30-in. natural-gas line from Texas to Joliet, Ill. . . .



ALWAYS ROOM FOR ONE MORE.—In the Signal Hill area of Long Beach, Calif., famous for its close spacing, modern portable rigs are drilling still more wells among the wooden derricks used when the field was first developed 29 years ago and the steel derricks of a later day. Recently a fault-block pool, passed up in earlier drilling, was found productive at 2,300 to 2,700 ft., and drilling has been very active. Some of the wells have had initial production rates in excess of 500 bbl. daily.

Forecast Revised

Bureau of Mines ups its earlier forecasts and estimates that demand will be 7.9 per cent over last half of 1949

John C. Casper

TOTAL demand for all petroleum products for the last half of this year will be about 7.9 per cent greater than in the last 6 months of 1949, according to the revised supply-and-demand forecast released by the U. S. Bureau of Mines.

Domestic demand is forecast at 6,476,000 bbl. daily for the last half, representing a gain of 8.7 per cent over the same period last year. Total exports for the last half are expected to be about 8.9 per cent less than last year or 272,000 bbl. daily. Total demand is set at 6,748,000 bbl. daily.

Probable last-half demands, reported in the new forecast, are about 4.4 per cent greater than in the last bureau projection, released at the end of May. Domestic demand was raised about 2 per cent to cover the increase in military requirements, with aviation gasoline showing the largest gain.

Compared with the May forecast, the new projection shows larger revisions for the third quarter than for the fourth. Total demand was revised upward by 5.6 per cent for the third quarter and 3.6 per cent for the fourth. These major revisions for the last half of the year were enough to raise the year's total by 3.1 per cent.

Stocks improve.—Production and imports are moving up faster than demand, resulting in an improved stock position. End-of-the-year stocks are now projected at just 5,000,000 bbl. less than at the beginning of the year, compared with a reduction of 25,600,000 bbl. estimated in the May forecast. Stock reductions for the year will not be evenly distributed by products or districts since residual stocks, particularly in California, will be substantially reduced while stocks of other products will gain in districts east of California.

During the summer months, indicated demand has been inflated by the large movement of distillates to consumer and reseller storage. Stocks in military custody, not included in weekly and monthly reports, are expected to increase. Considering these factors, total available stocks, reported and unreported, may be higher at the end of 1950 than at the end of 1949 or 1948.

Production up.—Crude production for the year is now forecast at 5,320,000 bbl. daily, an increase of 5.5 per cent over 1949. Light-hydrocarbon production is expected to up 14.7 per cent. The level of imports is set 30.5 per cent higher than last year with a large part of the increase charged to residual.

Domestic demand for the year was raised to 6,384,000 bbl. daily representing an increase of 10.2 per cent over last year. The decline in exports was estimated at 14.7 per cent for a net gain in total demand of 8.9 per cent.

These comparisons with the 1949 data result in increases that are greater than the normal year-to-year growth, and in some cases part of the gain can be charged to increased military purchases or increased industrial activity resulting from military needs.

However, consideration must be given to the fact that total demand in 1949 was 0.4 per cent less than in 1948 and the comparisons are made against an abnormally low base. A better picture of the growth in petroleum demand is shown by considering the gain of 8.5 per cent in total demand for the 2-year period 1948-1950. Total new supply for this year is expected to be only 3.3 per cent greater than in 1948 since in that year 293,000 bbl. daily went into primary storage compared with stock reductions amounting to 14,000 bbl. daily this year.

Total crude production forecast for this year represents a reduction of 3.6 per cent from the record set in 1948. Production in the first 5 months of the year averaged less than 5,000,000 bbl. daily, but the average for September is expected to be above the peak reached in December 1948. The new forecast places production in the third quarter at 5,634,000 bbl. daily, including field condensate. This is 2.2 per cent greater than the third-quarter average in 1948.

SUPPLY AND DEMAND—ALL OILS
Bureau of Mines Revised Forecast
(Thousands of barrels daily)

	Third quarter		Fourth quarter		Year 1950				Year 1948	Year 1949
	New forecast	Per cent* revised	New forecast	Per cent* revised	New forecast	Per cent* revised	Per cent change from 1949	Per cent change from 1948	(actual)	(actual)
Production	6,125	+ 6.4	6,076	+ 4.7	5,811	+ 3.1	+ 6.2	— 1.9	5,922	5,470
Crude	5,634	+ 6.7	5,554	+ 5.0	5,320	+ 3.3	+ 5.5	— 3.6	5,520	5,042
Other oils	491	+ 2.7	522	+ 2.1	491	+ 1.7	+14.7	+ 22.1	402	428
Imports	851	+16.0	870	+12.7	838	+10.1	+30.5	+ 63.0	514	642
Crude	510	+ 7.8	522	+ 9.3	493	+ 5.3	+16.0	+ 39.7	353	425
Refined	341	+30.8	348	+18.5	345	+17.8	+59.0	+114.3	161	217
New Supply	6,976	+ 7.5	6,946	+ 5.7	6,649	+ 4.0	+ 8.8	+ 3.3	6,436	6,112
Stock change	+447	.....	—21	.....	—14	.....	.....	.....	+293	—7
Crude	+ 77	.....	+55	.....	+ 3	.....	.....	.....	+ 71	—9
Other oils	+370	.....	—76	.....	—17	.....	.....	.....	+222	+2
Total demand	6,529	+ 5.6	6,967	+ 3.6	6,663	+ 3.1	+ 8.9	+ 8.5	6,143	6,119
Motor fuel	3,041	+ 4.8	2,783	+ 4.1	2,784	+ 2.6	+ 6.7	+ 12.2	2,482	2,609
Residual	1,406	+ 8.7	1,554	+ 5.9	1,520	+ 4.9	+ 9.2	+ 8.3	1,403	1,392
Distillate	802	+ 7.0	1,293	+ 0.8	1,090	+ 2.1	+17.0	+ 10.2	989	932
Kerosine	225	+ 3.5	408	+ 1.4	318	.....	+10.4	+ 0.6	316	288
Other	1,055	+ 3.3	929	+ 3.0	951	+ 3.6	+ 5.9	— 0.2	953	898
Exports	300	+12.6	243	+ 1.8	279	+ 6.3	—14.7	— 24.2	368	327
Crude	91	+12.0	65	.....	82	+ 7.1	— 8.9	— 24.8	109	90
Refined	209	+12.9	178	+ 2.5	197	+ 5.9	—17.0	— 23.9	259	237
Domestic demand	6,229	+ 5.3	6,724	+ 3.6	6,384	+ 2.9	+10.2	+ 10.5	5,775	5,792
Motor fuel	2,963	+ 4.8	2,723	+ 4.4	2,717	+ 2.9	+ 8.6	+ 14.2	2,380	2,501
Residual	1,363	+ 8.1	1,511	+ 5.3	1,477	+ 4.5	+ 8.8	+ 8.0	1,368	1,357
Distillate	770	+ 5.8	1,272	+ 0.9	1,080	+ 1.6	+17.9	+ 13.9	931	899
Kerosine	222	+ 4.6	404	+ 1.9	314	+ 0.4	+11.7	+ 2.6	306	281
Other	911	+ 2.2	814	+ 3.3	816	+ 3.1	+ 8.2	+ 3.3	790	754
Runs to stills	5,920	+ 5.5	5,902	+ 4.5	5,669	+ 2.8	+ 6.4	+ 1.3	5,597	5,330
Demand for domestic crude	5,564	+ 5.4	5,500	+ 4.0	5,320	+ 2.7	+ 5.4	— 2.6	5,460	5,048

*Per cent change from May 1950 forecast.

XUM

Stability Threat

ECA ruling on petroleum prices in Persian Gulf effects relatively small volume, but may disturb entire trade

Dahl M. Duff

NEW YORK.—The Economic Cooperation Administration's order reducing products prices in the Persian Gulf is of less importance for its own sake than it is in its possible effects on the accepted pricing structure of the international petroleum trade.

The ECA ruling applies only to the relatively small volume of products moving from Persian Gulf refineries into Europe and the Mediterranean area. It is also limited to shipments made into participating countries for which ECA provides dollar reimbursement to the supplying oil companies.

By amendment 5 to its Regulation 1, published in the Federal Register, ECA specified that shipments from the Persian Gulf with its finances, must be at least $3.50 a long ton below what is now in general the prevailing price. For 53°-gravity material, this is equivalent to 1 cent a gallon.

ECA officials in Washington estimated the new requirement would save between $3,000,000 and $4,000,000 a year in lower products prices. Based on this estimate and figuring average saving at $3.50 a ton, this means the volume of products affected amounts to, roughly, a million tons a year, or about 20,000 bbl. daily. In comparison to this, total Persian Gulf refining capacity approximates 800,000 bbl. daily.

Serious implications. — The broader implications of the order appear to be more serious for the industry. General commercial sales not financed by the ECA and in which it presumably has no direct interest tend to be governed by such an order since any purchaser naturally wants the lowest price prevailing. Thus, the order threatens the stability of the overall level of prices.

It is also felt there is a possibility Caribbean prices will be forced lower in areas where they are underpriced by the new level in Persian Gulf. A further, and more remote, possibility is that Gulf Coast prices in turn will be affected because of lower level in the Caribbean or by material backed out of Europe. One official commented that this would be an especially acute threat if the United States exported petroleum products in the same degree that it did several years ago.

Differential recognized.—Besides the $3.50-a-ton reduction for shipments from Ras Tanura in Saudi Arabia and from Bahrein, the ECA requirement makes a greater cut of $4 for Kuwait and still more, $4.20, for Iranian ports, namely Abadan. Though ECA-financed shipments out of the Anglo-Iranian Oil Co., Ltd., refinery at Abadan are said to be exceedingly small, the order gives some official stature to a heretofore unrecognized freight differential for these points farther to the north in the Persian Gulf.

For most destinations from Abadan, the old U. S. Maritime Commission rate schedule provided a 70-cent differential over Ras Tanura and Bahrein. No such differential was made in the British Ministry of Transport schedule, and it has not been practiced in chartering in recent years.

Some such action on the part of ECA regarding Persian Gulf products prices has been anticipated for months but the exact form it would take was not known. Oil-company shipping and marketing analysts last week continued to study the new pricing requirement as well as a lengthy ECA letter reported to have been sent to the companies.

Confused meaning. — Early in the week, oil-company officials in New York said the trade was in a state of confusion over the exact meaning of the order. To these published reports, ECA officials in Washington replied the order had been extensively discussed with the companies and that "the only thing that might have surprised them is that we went ahead and issued it."

The amended regulation is effective September 15. It declares: "A price for a purchase of a petroleum product from any source will not be approved for reimbursement if it results in a delivered cost to a participating country which is in excess of the lowest prevailing delivered cost, on the date the ocean carrier tenders to load, for a comparable export sale of the same or similar commodity to such participating country from any alternative source of supply for which the commodity is available for export in sufficient quantity."

The change says that, for shipments from the Persian Gulf, this lowest comparable price is reduced by $3.50, $4, and $4.50 a ton in the case of Ras Tanura and Bahrein, Kuwait, and Abadan, respectively. For shipments into western Europe, these prices are further reduced by 85 cents for the United Kingdom-Bordeaux area, $1.15 to Sweden, $1.25 to Denmark, and $1.35 to Norway.

Caribbean competition.—Although western Europe and the Mediterranean have been supplied to a great extent for some time from their own refineries and from Caribbean sources, practice in the industry has been to sell products from the Persian Gulf in these areas at delivered prices which met Caribbean competition, or the base price plus Caribbean freight to destination. In the case of western Europe, this required a degree of freight absorption since freight from the Caribbean is lower than from the Persian Gulf. In the Eastern Mediterranean, under this system, prices were higher, though the area is farther from the Caribbean. This anomoly was apparently what was meant when ECA officials referred to price discrimina-

A.P.I. SPECIAL.—Reservations are going fast for the special trains from Tulsa and Chicago to the annual meeting of the American Petroleum Institute in Los Angeles in November. The trains are sponsored by The Oil and Gas Journal and will be operated by the Santa Fe Railway Co. exclusively for A.P.I. conventioners. The trains will leave Tulsa and Chicago the evening of November 10 and reach Los Angeles the morning of November 12. Returning, the trains will leave Los Angeles the evening of November 16 and reach their starting points in the afternoon of November 18.

tion as between countries and areas.

Under the old U.S.M.C. rate schedule, freight from the Persian Gulf—which includes high Suez Canal tolls—and from the Caribbean is about equal to Malta. As will be noted from the following table showing some U.S.M.C. rates per long ton, the differential between Caribbean and Persian Gulf is $3.50 at Gibralter.

To—	From Caribbean	From Ras Tanura
United Kingdom	$6.55	$10.90
Gibralter	5.65	9.15
Naples, Italy	7.05	8.15
Greece	8.05	7.35

One official of a leading oil company said the order as promulgated was objectionable, not only on general grounds but also insofar as its practical operation was concerned. Referring to the wording, he said there is no certain way for his company to know what is the lowest prevailing delivered cost on the date the tanker tenders to load, since it does not know freight charges involved in various other transactions.

Shippers complain.—Furthermore, he said the effective date of September 15 gave much too short notice in view of existing contracts and sales planning. He contended the phrasing, "alternative source from which the commodity is available for export in sufficient quantity," is vague and subject to misinterpretation. He also raised other practical objections.

The ECA action regarding product prices follows the cut in Persian Gulf crude-oil prices about a year ago. These had several reductions under ECA influence to their present level of about $1.75 a barrel for 36° gravity.

The ECA is understood to have long questioned the continued United States Gulf low for products in view of the lower level of crude prices. Against this was the view of one company official who declared that Persian Gulf refinery price spreads between crude and products was not excessive when the over-all expenditure in an oil operation in the Middle East was considered, including not only the refinery itself but other outlays for housing, medical care, and other items. In addition, an oil undertaking in the Middle East involves considerably greater risk than in more secure parts of the world.

ECA's Washington announcement said that under the amendment, f.o.b. Middle East prices may not exceed United States prices less the $3.50 to $4.20 reduction. "The new price limitations were announced after a careful study of historical pricing procedure and current supply conditions in the Middle East," the agency said. "The action follows ECA's regular policy of financing shipments at lowest market prices and is intended to assist suppliers in complying with ECA price policy while making their price negotiations."

Platte Pipe Line Launched

Right-of-way survey now in progress and completion due in 18 months for crude line from Rocky Mountain area

CASPER, Wyo.—Work already has started on the big crude-oil pipe line from Wyoming to Wood River, Ill., even though plans for the project were kept secret until the formal announcement here August 29 *(The Oil and Gas Journal, August 31, page 37)*.

Aerial survey work for the right-of-way is virtually completed and ground survey work is starting immediately, it was disclosed at the conference of officials of the five oil companies which have jointly formed Platte Pipe Line Co. to construct and operate the line.

These companies are Sinclair Refining Co., Pure Oil Co., Ohio Oil Co., Continental Oil Co., and British American Oil Co., Ltd., of Canada and its United States subsidiary, British-American Oil Producing Co.

The ownership percentages in Platte Pipe Line Co. has not been disclosed, but it is understood that for the present the five participants will have equal voices in management of the line. But beyond this, the officials emphasized, the five companies will continue to compete for production and markets as vigorously as before. All have production in the Rocky Mountain area and refineries in the Midwest which can receive crude through connections at Wood River.

Pipe for the $60,000,000 line has been ordered and first shipments are expected in February 1951. The participants hope to have the line completed within 12 to 18 months, although they have not yet announced the names of contractors, location of the new company's headquarters, nor names of officers beyond the statement that H. L. Phillips, president of Sinclair Oil & Gas Co., is serving as president of Platte Pipe Line Co.

Oil producers in Wyoming are elated that the long-rumored project actual-

Rube Goldberg Views the News for His Latest Invention

HOW TO GET A HUSBAND

DRUM MAJORETTE (A), MARCHING IN LABOR DAY PARADE, KICKS OVER BERNARD M. BARUCH'S PARK BENCH (B), RELEASING CAN OF REJECTED RUSSIAN CRABMEAT (C) WHICH FALLS ON SEOUL CITY SUE'S MICROPHONE (D), CAUSING A SHORT CIRCUIT AND LIGHTING CANDLES ON PRINCESS MARGARET'S BIRTHDAY CAKE (E) WHICH SMOKES MALIK OUT OF HEAD SEAT IN SECURITY COUNCIL (F) STRING (G) EXPOSES CHEESECAKE ART (H) AND FUN-LOVING KING FAROUK (I) GIVES WOLF CALL—REAL WOLF (J), THINKING IT IS HIS MATE, JUMPS THROUGH WINDOW (K), LETTING IN ATLANTIC COAST HURRICANE (L) WHICH BLOWS $6-DOLLAR STEAK (M) OFF BLOCK, UNZIPPING CUSHION (N) AND RELEASING MIDGET MINISTER (O) WHO PERFORMS MARRIAGE CEREMONY BEFORE SHY SUITOR (P) CAN GET AWAY.

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XUM

At the Casper conference announcing the formation of Platte Pipe Line Co. are L. S. Wescoat, president of Pure Oil Co.; P. C. Spencer, president of Sinclair Refining Co.; L. F. McCollum, president of Continental Oil Co.; and J. C. Donnell, II, president of Ohio Oil Co. W. K. Whiteford, president of British American Oil Co., was delayed by bad flying weather in Canada but British-American Oil Producing Co. was represented by C. D. Miller, executive vice president, Tulsa.

ly is under way. The Rocky Mountain area is now capable of producing more crude than it can refine or consume, and an additional outlet to a region of heavy consumption has been discussed for years. As the line nears completion it is expected that exploration and drilling activity in Wyoming and adjacent areas will increase considerably.

Private Pipe Line

Champlin wins a round in its long fight to keep its line from being declared a common carrier open to competitors

CHAMPLIN REFINING CO. has won the latest round in its long fight to keep its products pipe line from being declared a common carrier. Champlin is one of the few hold-outs against the Government's campaign to classify all interstate pipe lines as common carriers, and its lone struggle has been watched with interest by other pipe-line companies.

Last week a three-judge federal District Court in Oklahoma City ruled, two-to-one, that Champlin does not have to comply with an order of the Interstate Commerce Commission requiring it to file tariff rates and shipping rules for public use of its line. The decision doubtless will be appealed by the Government.

Champlin owns and operates a 6-in. gasoline pipe line extending 516 miles from its refinery at Enid, Okla., to its own terminals and loading racks at Hutchinson, Kans., Superior, Neb., and Rock Rapids, Iowa. It has never shipped products for anyone else, it connects with no other pipe lines, and there is no physical way of putting products into the line except through the Champlin refinery.

Nevertheless, the ICC ruled that if a pipe line crosses a state border it is a common carrier under the law and must file tariffs for public use even though it was constructed entirely as a plant facility and it is virtually impossible for anyone else to ship over it.

The fight goes back many years. First the ICC ordered Champlin to file a valuation report on its pipe line. The company appealed to the Supreme Court, which ruled that such reports must be filed. So, in February 1948, the ICC issued an order requiring Champlin to show cause why it should not file tariffs.

Changed method.—Champlin's answer was that since the original case was brought it had revised its method of pricing so that the line was no longer operated in a manner which might make it a common carrier. Originally Champlin quoted prices of gasoline and other products at its terminals on the basis of prices f.o.b. the Enid refinery plus rail freight to the terminals. Its present method is to quote delivered prices at its terminals, these being set by local competitive conditions.

The company contended that with the transportation charge eliminated from the prices, the line could no longer be considered a common carrier but simply an adjunct of the refinery. It argued that filing tariffs would commit it to the obligation to open the line to public use and permit competitors to make physical connections with the effect of converting private property to public use. In an effort to show that its line is not clothed with a public interest, Champlin showed that it moves only a small fraction of the petroleum products shipped between the areas served and that no other refineries in the region have any need to use its line.

These arguments were brushed aside by the ICC, however, which said that the law requires an interstate pipe line to file tariffs. The commission admitted that it knows of no law or authority which might be used to force Champlin to make a physical connection with a competitor, and declared that therefore the filing of tariffs would not impose any hardship on Champlin. If its order amounts to taking private property for public use, the commission said, that is a question for the courts to decide.

This order was issued by the ICC in June 1949, and is the one which was reviewed by the Oklahoma City federal court. Two of the ICC members dissented when the order was issued.

Dissenting views.—Commissioner Walter M. W. Splawn, who has traditionally championed the "plant facility" theory of oil pipe lines, said that Supreme Court decisions in this and similar cases permit a distinction between requiring financial reports and filing tariffs, and declared:

"I cannot agree with the conclusion in this report that the filing of tariffs by Champlin will not be a hardship, or deprive it of the free use of its pipe-line facilities in the conduct of its refining business. On the contrary, it is reasonable to assume that Champlin will be called upon to perform the transportation service held out under its duly published tariffs; otherwise, it seems we are requiring a vain act for which there is no justification in law or sound reason."

Commissioner Richard F. Mitchell said "(The law) does not contemplate that a pipe line carrying only its own products as an incident to its principal business and not offering its services to the public is engaged in the transportation of oil as a common carrier.

"To require that Champlin publish and file tariffs with us can only be for one purpose, viz: to make Champlin's pipe line available for use by all shippers. If that is not the purpose, then the requirement that tariffs be filed is an idle and futile gesture. If, following the filing of tariffs, Champlin's pipe line is used by other shippers, then to the extent of that use we are depriving Champlin of the use of its own pipe line for its own products.

"The majority find that the entire capacity of the pipe line is used in transporting the products of Champlin's refinery. If the pipe line is not used by others, Champlin will be the carrier and the sole shipper. Champlin will tender shipments to itself; it will bill itself; it will give notice of arrival at destination to itself; and it will pay itself. It was never intended that an interpretation of the act should bring about such a situation."

TECHNOLOGY

Chemists' Conclave

A.C.S. meeting includes many petroleum papers

CHICAGO.—Reports on investigations into such petroleum-industry subjects as the properties of asphalt, the effect of nitrogen compounds on the stability of fuel oils in storage, and the mechanism of the Fischer-Tropsch reaction are being given here this week at the semi-annual meeting of the American Chemical Society.

A total of 41 papers were being presented at sessions of the society's Division of Petroleum Chemistry. Other meetings of interest to the several hundred oil-company chemists attending included those of the Division of Gas and Fuel Chemistry, and the Division of Paint, Varnish, and Plastics Chemistry.

The increasing importance of the use of petroleum products in combating agricultural pests and weeds were reflected in the day and a half of meetings of the Petroleum Chemistry Division which were devoted to symposiums on agricultural application of petroleum products. Scientists from a number of oil-company laboratories discussed work in developing, among other products, tree sprays, mosquito-control oils, petroleum fractions for use against California red scale and citrus red mite, DDT solvents, and various hydrocarbons for herbicidal use.

Another Petroleum Chemistry Division meeting consisted of a symposium of the use of isotopes in petroleum chemistry. Several of the 14 papers given in this field related to investigations dealing with cracking catalysts. The third general session of the Petroleum Chemistry group brought reports on a number of miscellaneous developments, including the relation of octane number to cool-flame formation, a new laboratory equilibrium flash still, and the recovery of inorganic ash from petroleum oils.

NATIONAL AFFAIRS

Mineral Rights

Bill untangles mess on farm lands sold by U. S.

WASHINGTON.—Final passage of a bill to permit transfer of mineral as well as surface rights to farmers who buy land from the Department of Agriculture awaits only a minor adjustment of differences between the House and Senate versions of the bill.

The Senate passed the bill last week to permit the sale of the mineral rights. A similar bill passed the House June 20.

Purpose of the legislation primarily was to correct an oversight in 1946 legislation relating to the Farmers Home Administration of the Department of Agriculture. A feature of that law provided for the conveyance by the Government to the buyer of a Farmers Home Administration piece of property of the mineral as well as the surface rights. The 1946 act, however, was silent about the mineral rights to land sold prior to 1946.

Under the 1946 legislation a farmer who buys land from the agency gets the mineral rights transferred immediately. On the past sales, before 1946, under the new legislation, they get the mineral rights for a nominal $1 fee in areas where no mineral activity is apparent or in prospect.

For land sold prior to 1946 in an area where there is a prospect of subsurface minerals, the value of these speculative mineral rights are appraised by the Secretary of Agriculture in consultation with the Secretary of the Interior and local officials, and are sold at the appraised price.

The legislation also includes in its terms provision for the conveyance to buyers of mineral rights in land sold to farmers by the Federal Land Banks. Such banks acquire farm property in foreclosure.

The Senate change from the House bill provides that for lands sold prior to 1946, if the buyer does not in 7 years after passage of the act apply to the Secretary of Agriculture for mineral rights, they will be transferred to the Interior Department. In other words, the farmer-buyer to acquire the mineral rights on property sold to him by either the Land Bank or the Agricultural FHA, must act, request, or take the initiative to buy these mineral rights. If he does not, they revert to the Interior Department.

SOUTHWEST

Isobutane Planned

Construction due soon on North Snyder plant

SNYDER, Tex.—Work is expected to start soon on construction of the North Snyder natural-gasoline plant, to be built by 35 operators in the field and managed by Sunray Oil Corp.

The advisory committee for the project met last week in Tulsa and announced that plans for the $6,800,000 plant have been drawn to incorporate equipment to produce isobutane, currently in demand for synthetic rubber and aviation gasoline. The committee is now negotiating with Fluor Corp. for construction of the processing facilities. Design of the unit calls for capacity to process approximately 50,000,000 cu. ft. of gas per day. With extraction of 70 per cent propane this will yield approximately 420,000 gal. daily of liquid products, including natural gasoline, propane, butane, and isobutane.

The committee also let contracts for the laying of approximately 130 miles of low-pressure gas-gathering pipe lines, varying from 4 to 30 in. in diameter, connecting participating units to the site of the new plant. The gathering lines will serve 25,000 units in North Snyder, Kelly-Canyon, and Diamond M fields in Scurry County. At present the operators are delivering about 15,000,000 cu. ft. of high-pressure natural gas daily to El Paso Natural Gas Co. and Lone Star Pipe Line Co.

Advisory committee for the North Snyder gasoline plant: Seated—R. W. Johnston, Cities Service Oil Co., Bartlesville; A. V. Murray, Sunray Oil Corp.; H. W. Manley, chairman, Sunray Oil Corp., Tulsa; E. A. Brown, Lone Star Producing Co., Dallas; Helen Wells, committee secretary, Sunray Oil Corp.; J. C. Birdsall, L. M. Lockhart, Corpus Christi. Standing—D. S. Wallace, Fullerton Oil Co.; J. R. McMillan, Fullerton Oil Co., Pasadena, Calif.; L. G. Rodgers, Sunray Oil Corp.; J. M. Kindle, Lone Star Producing Co., Dallas; M. R. Lents, Scurry Natural Gasoline Co., Houston; J. A. Craig, Skelly Oil Co., Tulsa.

XUM

Tapline Triumph

Most-hampered pipe line will start delivering crude to tankers in December after meeting many obstacles

Paul Reed

THE strategic importance of the desert venture of Trans-Arabian Pipe Line Co. will soon be apparent in world petroleum markets.

Pipe laying on the 1,000-mile line from the Persian Gulf to the Mediterranean is scheduled to be completed October 1, and by December tankers should be loading Saudi Arabian crude oil at Sidon, Lebanon. By eliminating the long tanker haul around the Arabian Peninsula and the Suez Canal tolls, the "Tapline" will deliver crude at Europe's back door far more economically than by previous movements.

The line's throughput is expected to be about 100,000 bbl. daily by the end of December, when three pump stations are scheduled to be in operation. During the winter a fourth station is due to increase this to 265,000 bbl. daily, and when all six scheduled stations are in operation next April the line will deliver 315,000 bbl. daily. The line is so designed that the addition of six more stations at intermediate points could raise its daily capacity to more than 550,000 bbl.

Tapline's diameter of 30 and 31 in. makes it the largest-diameter crude-oil pipe line ever built. Its builders claim that the shipment of pipe and other materials needed for construction constituted the largest single marine transportation job in war or peace.

Troubled history.—Still another record could be claimed for Tapline. Probably no pipe line in history ran into so many false starts, disappointments, controversies, and obstacles as this project.

It became entangled in wars, international rivalries, military strategy, steel shortages, government intervention, and political pressures. There were times when it appeared that it would never be built, and there were many people who hoped it never would be.

The concept of a big-inch pipe line to the Mediterranean took shape during the war, when the then-young Arabian American Oil Co. began to realize what tremendous crude reserves were awaiting development in its concession in Saudi Arabia. That crude was badly needed by the Allies, but tankers could ill be spared for the 7,500-mile, 20-day round trip between the Persian Gulf and the Eastern Mediterranean.

In 1944, at the height of the war, a possible pipe-line route was reconnoitered by Bert E. Hull, now president of Trans-Arabian Pipe Line Co. and then pipe-line expert of The Texas Co., one of the owners of Arabian American. But because of war hazards and material shortages the proposition was too big for private industry to handle.

Government intervention.—So the Petroleum Administration for War took a hand. A party of American oil men was sent to Arabia to make a survey. A government corporation, Petroleum Reserves Corp., was chartered to build the line. After long negotiations—and considerable pressure—an agreement was drawn between PRC and Arabian American under which the Government would build the pipe line in exchange for a percentage of the crude reserves to be developed in Saudi Arabia.

News of this agreement raised a storm of protest from oil producers and in Washington. A Senate committee ordered an investigation. Opposition to government ownership of foreign oil operations was so strong that the project was dropped.

Then the Aramco partners, The Texas Co. and Standard Oil Co. of California, started over again. Trans-Arabian Pipe Line Co. was chartered in July 1945. As soon as the war ended, Tapline began surveying a route and negotiating transit rights. By 1947 transit privileges had been obtained from Saudi Arabia, Transjordan, Palestine, and Lebanon. But the necessary agreement with Syria was not ratified until May 1949, and until then there was no certainty as to the route of the line.

Start made.—Nevertheless, Tapline proceeded with construction plans. Financing was arranged, construction and equipment contracts were let, and pipe was ordered from the new Los Angeles mill of Consolidated Western Steel Co., with shipments to start late in 1947. A special fleet of cargo ships was assembled, with hatches modified to take the long sections of nested 30 and 31-in. pipe.

The ships were routed to both the Persian Gulf and the Mediterranean, as it was planned to start at both ends of the line and work toward the middle. But in late 1947, before the first shipments arrived, warfare broke out along the Palestine border between Jews and Arabs. This made work impossible on the western end, so the ships were diverted to Saudi Arabia and a start was made on the eastern end.

No sooner had a good start been made, however, than the U. S. Department of Commerce, which administers export controls, suspended Tapline's license to export pipe. This action was

At the peak of Tapline construction work this year the Journal's pipe-line editor traveled the entire length of the line and visited all work under way. This is the first of a series of four articles. The second will appear next week.

Discussing construction work on the Trans-Arabian line at the Beirut headquarters are: W. R. Chandler, assistant general manager and chief engineer of Tapline; D. R. Williams, vice president of Williams Brothers Corp.; H. B. Beckley, superintendent of operations for Tapline; and W. A. Campbell, Tapline's manager of government relations.

variously motivated by the international situation in the Near East, shortage of pipe for domestic pipeline projects, and political opposition to a project which threatened to permit a flood of low-priced foreign oil to move toward the United States.

Work suspended.—Because of the steel embargo and the Palestine war, Williams Brothers Overseas Co., which had the contract for the western end, virtually closed its operations. On the eastern end, however, International Bechtel, Inc., went ahead with what pipe was available. But instead of starting on the original route, about 40 miles of pipe was laid to connect Abqaiq and Qatif fields with Aramco's refinery at Ras Tanura, so that the pipe delivered in Saudi Arabia was put to good use.

But since April 1948 Tapline has had smooth sailing. Political disturbances in the Middle East quieted down, licenses to export pipe were issued, shipping was reassembled, new crews were sent to the site, and operations began in earnest on both ends of the route.

Natural obstacles. — With political obstacles out of the way, the forces of nature had to be met. These were chiefly drought, desert terrain, and remoteness.

Not only were there no roads nor communities along the 1,000-mile route, except for a few miles in from the Lebanese coast, but until the first reconnaissance parties no one had ever traveled the route by vehicle. It was necessary for Tapline to build roads along the route capable of handling 50-ton trucks. This highway is now being used by the general public for motor trips between the Mediterranean and cities on the Persian Gulf.

The big sand dunes usually associated with Arabian desert are found only in the first 100 miles of the eastern end of the route. For the next 750 miles westward the route crosses absolutely barren desert land to the Transjordan frontier. The only noticeable surface features are occasional wadis, dry watercourses where water flows or stands only for a few hours after the rare winter rains. The surface of this stretch is either level or gently sloping and is about evenly divided between smooth gravel plains, disintegrated limestone overlying hard limestone strata, and level country with 2 to 6 in. of topsoil covering limestone hard enough to require blasting for removal.

Because of these features it was decided not to ditch and bury the line but to lay it aboveground. This novel type of restrained construction has proved entirely satisfactory, but would not be practical across country which will not be barren perpetually.

The 80-mile stretch aeross Jordania is the toughest section of the entire route because the surface is completely covered with extremely hard basalt and volcanic lava, disintegrated into chunks ranging from a few pounds to as much as several tons. It is practically an insurmountable obstacle for pedestrians. Slopes are moderate, but the line reaches its highest elevation, 2,940 ft., along this stretch.

The stretch of slightly more than 100 miles across Syria resembles West Texas and New Mexico in some respects. Although the surface is covered with some broken limestone, about 40 or 50 miles crosses lands cultivated for wheat.

Approaching the Syrio-Lebanese frontier the line descends a steep escarpment. Here the line crosses two or three creeks, which are the only streams of running water on the entire length of the route. After crossing the Lebanese range in Lebanon, the downward approach to the Mediterranean is rough and rocky, resembling some portions of the Alleghenies.

Water Problem.—There was absolutely no water available along the route between the Persian Gulf and the Lebanon border, so Tapline had to drill deep pumping wells at each pump station and at intermediate points. These are now used extensively by the nomadic Bedouins for watering their flocks of camels, sheep, and goats.

Originally Tapline was scheduled to be 1,068 miles in length. However, 315 miles at the eastern end have been incorporated into Aramco's crude-oil gathering system, so that Tapline proper is only 750 miles long. Since the line was first projected Aramco has developed new fields along or adjacent to its route and has completed its Ras Tanura refinery. Under the new arrangement, Aramco will deliver crude to Tapline at Qaisumah.

Executives of Trans-Arabian Pipe Line Co. at the headquarters of the company in Beirut, Lebanon: A. N. Horne, vice president and general manager; Burt E. Hull, president; G. H. Gossens, assistant to the general manager.

CITY LIFE.—In drilling this gas well 3 blocks from the city hall of Alvin, Brazoria County, Texas, and in the back yard of the Baptist Church, H. L. Hunt shuts down the rig during church services and takes other unusual precautions such as special exhaust mufflers and baffle walls to protect trees from boiler heat.

XUM

Sterling Controls

The dollar-oil controversy with Britain has quieted, but our State Department says the system still curbs trade

Bertram F. Linz

WASHINGTON. — The dollar-sterling oil controversy, quieted for the time being by agreements reached by the British Government with individual oil companies but far from settled permanently to the satisfaction of our State Department, is conclusive evidence of the strong control England maintains over world trade.

A fact sheet just prepared in the State Department shows how Britain has divided the world into five monetary areas in most of which, directly or indirectly, it is able to limit trade with the so-called dollar area. As the international financial and commercial center of a large group of countries, the United Kingdom was in a position to direct currency exchanges even before the last war, but the current terms "sterling area" and "dollar area" came into use as designations for large groups of countries only during World War II.

Sterling area. — The sterling area itself consists of the United Kingdom, its colonies and protectorates, and Australia, Burma, Ceylon, Iceland, India, Iraq, Ireland, New Zealand, Pakistan, and Union of South Africa. In general, these countries deposit their nonsterling exchange earnings (dollars, francs, etc.) in, and draw their nonsterling exchange requirements from, a common pool managed by the Bank of England.

They carry on a large portion of their trade with the United Kingdom and finance most of the remainder in sterling, which can be transferred freely between them. But transfers of sterling from a member to a nonmember requires Bank of England approval, which usually is granted freely with respect to transfers to soft-currency countries but is limited with respect to transfers to American accounts (equivalent to conversion into dollars) and to other accounts which might lead to gold or dollar payments by Britain. In this area, the restrictions on transfers serves as a control, such as was imposed last January with respect to imports of dollar oil, on imports generally from the dollar area.

Transfer areas.—A second group of so-called transferable - account countries, comprising the Anglo-Egyptian Sudan, Chile, Czechoslovakia, the Dutch monetary area, Egypt, Ethiopia, Finland, Iran, Italy, Norway, Poland, the Spanish monetary area, Sweden, Thailand (Siam), and Russia. Sterling may be freely transferred between these countries and with the sterling area, but all other sterling transfers require approval by the British exchange-control authorities, thus permitting restrictions on transfers to American accounts.

Another category has been set up for so-called bilateral-account countries, including Argentina, Austria, the Belgian monetary area, Brazil, Bulgaria, Canada, China, Denmark, Formosa, the French franc area, French Somaliland, Greece, Hashemite Jordan, Hungary, Israel, Japan, Lebanon, Paraguay, Peru, the Portuguese monetary area, Romania, Switzerland, Syria, Tangier, Turkey, Uruguay, Vatican City, Western Germany, and Yugoslavia.

From these countries sterling may be transferred freely only to the sterling area, and transfers to any other bilateral-account country or to any other class of account are restricted, the effect being to limit imports of dollar products to such volumes as can be met from their dollar balances.

The rest of the world with the exception of the dollar area is classified as residual - account countries, specifically Afghanistan, Albania, Cyrenaica, Eritrea, Liberia, Saudi Arabia, and Tripolitania. Sterling may be transferred freely in current transactions between these countries and from their accounts to the sterling area, but again, all other transfers are restricted.

Dollar area.—The dollar area ("American-account" countries) consists of the United States and its possessions, Bolivia, Colombia, Costa Rica, Dominican Republic, Cuba, Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Philippine Islands, Salvador, and Venezuela. Sterling may be transferred freely from one American account to another and to all other accounts except those in the bilateral group, which are restricted. Sterling balances in American accounts are convertible into dollars; consequently, transfers to such accounts from other sterling accounts are generally not permitted.

Through these arrangements with the various countries, Britain is able to cut the drain on her dollar resources which would follow were sterling freely convertible, and at the same time is in a position to further her own export trade with countries which are long on sterling but short on dollars.

Theoretically, such a set-up could lead eventually to a freeze-out of many American export commodities in some sections of the country, but

ITALIAN REFINERY.—View of the enlarged and reconstructed refinery of Socony-Vacuum Italiana, S.p.A., at Naples. Wrecked by bombing and German demolition during the war, it was restored by improvising and salvaging to a little more than its prewar capacity of 6,000 bbl. by November 1946. It has since been stepped up in capacity to 35,000 bbl. daily and has become a modern processing unit of importance to the European economy.

Britain has given assurances, by treaty and otherwise, that such is not the purpose but, rather, to develop sufficient dollar exchange to permit the return of world trade to more normal conditions.

LATIN AMERICA

Venezuelan Review

Increase expected soon in exploration activity

A FURTHER slight decline in exploration and drilling activity in Venezuela is noted in recent reports on the total of rigs running and the number of parties active.

Operating rigs in Venezuela at the end of July numbered 85, including workovers and cleanouts, against 91 the end of the previous month, 88 in April, and 127 in May of last year. Geological and geophysical parties in the field during June totaled 30, a decline of 3 from the previous month.

Operating rigs in Venezuela are shown in the following table:

	July 1950	June 1950	April 1950	May 1949
Field wells	40	43	48	76
Exploratory	28	29	26	38
Workovers and cleanouts	17	19	14	13
	85	91	88	127

Shell led among the companies with a total of 23 rigs running. In its Western Venezuelan operations, Shell had 14 on field wells and 6 on exploratory holes. Of the total of 85 rigs of all companies, 36 were in Western Venezuela.

Mene Grande had 17 rigs running in Eastern Venezuela, including 13 on field wells, and 2 rigs in Western Venezuela. Creole had seven rigs active in Western Venezuela and four in Eastern Venezuela. In Eastern Venezuela, other companies and number of rigs were: Sinclair four, Phillips five, Socony - Vacuum six, Las Mercedes six, Venezuelan Atlantic five, and Texas two. Unofficial reports in Venezuela were that Mene Grande will increase its rigs in Eastern Venezuela to 21 by the end of the year.

Fewer field parties.—The decline in number of parties active was due to the discontinuation of two seismograph and one structure-drill party during June. This brought the total of parties to 30 as summarized in the following table:

	June 1950	May 1950	Jan. 1950
Geological	14	14	23
Structure drill	1	2	2
Gravity meter	3	3	3
Seismograph	11	13	15
Telluric survey	1	1	1
	30	33	44

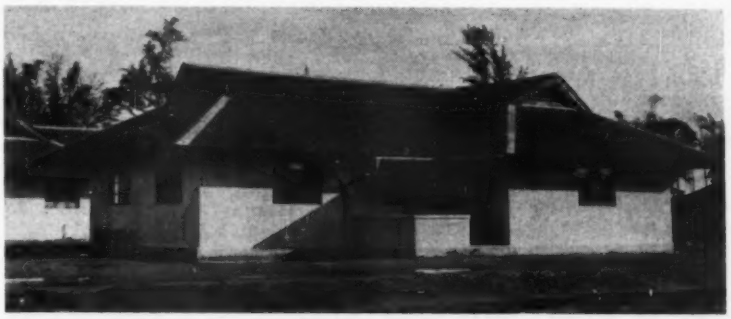
Shell was also the most active company in this phase of exploratory work, and in June had three geological, four seismograph, one gravity-meter, and the one telluric - survey party. Creole had four geological parties, one seismograph, and one gravity meter. Mene Grande had one seismograph, one structure-drill, and one geological party in the field.

There is some belief that these activities which reflect the level of drilling and exploratory work in Venezuela will turn upward later this year. Venezuelan production has recently been at record levels, and these operations generally follow the production trend, though with a considerable time lag. The government is reported to have recently asked the companies to make a major increase in production potential over the next few years.

Political phases. — Total Venezuelan oil output in the week ended August 14 moved back up to 1,585,460 bbl. daily. Production on a daily average basis dropped off to about 1,530,000 bbl. daily in the latter part of July, after the record - breaking levels of early July and late June.

On the political, or diplomatic front, the Venezuelan industry noted with interest the announcement of the transfer of U. S. Ambassador Walter Donnelly from Caracas. Donnelly, who generally was well regarded in the industry, is being moved to Austria where he will be U. S. Commissioner.

Still awaited is the settlement between the companies and the Venezuelan Government regarding revision of royalty payments for lower-gravity oil production. The affected companies are paying the minimum under the concession contracts with other amounts set aside to meet possible final terms. There is some feeling a compromise will be worked out between the positions of the two sides.



BORNEO HOUSING.—More than 700 concrete houses like this are being built by the Shell organization for personnel at Seria field in Brunei, British Borneo, where post-war development has increased production to 70,000 bbl. per day, making it the largest producing area in the British Empire. The housing program, to be completed by August 1952, will house 1,500 employes and comprises 40 blocks of bachelor quarters, 100 blocks of senior artisans' houses, 175 three-room artisans' houses, 300 laborers' houses, 30 senior Asiatic staff houses, and 80 senior European staff houses.

United Survey

Four major Venezuelan companies pool search

A JOINT seismograph survey of existing concession holdings in Lake Maracaibo in Venezuela has been arranged by four major Venezuelan producing companies.

The companies are reported to have engaged Marine Exploration Co., Houston, to carry out the project. The survey is said to be the first extensive seismograph study ever made in the submerged areas of the lake.

The companies involved are Creole Petroleum Co., Mene Grande Oil Co., Shell, and Richmond Exploration Co. These four operators now hold concessions extending generally over the northern third of the lake area.

The Venezuelan Government has formulated a set of regulations governing the work and designed to protect marine life. These rules were drawn up after consideration of seismograph prospecting regulations placed in effect some 2 years ago by the Land Commissioner's office in Texas.

The government's requirement that only one boat at a time will be used for the Lake Maracaibo seismograph survey led the companies to decide on a joint project. It is understood the work will be based on single-boat techniques which were outlined in an article in *The Oil and Gas Journal, April 13, page 82.* This reported 600 to 650 miles continuous-line seismic profile per month obtained in a one-boat shooting project in the Gulf of Mexico.

The requirements of the Venezuelan Government for the Lake Maracaibo project require that permission for the work must be obtained from the ministries of National Defense, Fomento, and Agriculture. The per-

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mits, which must be renewed every 6 months, allow seismic work only in the presence of a government inspector and during the hours from 6 a.m. to 6 p.m. The work is restricted to the period July through December with extensions possible under special circumstances. No conventional marine seismic work can be conducted within a 2-km. offshore zone, and a properly equipped launch must be placed at the disposal of the required government inspector to permit him to carry out his duties.

Support fish industry.—As a condition of permission for the project, the companies are reported to be making a contribution of 100,000 Bs. (about $33,000) to the government. This will be used to establish fish hatcheries and possibly to provide some support to the Fishermen's Union. Another 50,000 Bs. (about $16,500) contribution is being made to the government to pay the salaries and expenses of a technical fish expert.

The surveys are restricted to concessions now held by the companies. There is no provision for payment of damages to the Fishermen's Union, but the group is given permission to collect eatable fish.

Three of Venezuela's largest producing fields, Lagunillas, Bachaquero, and Tia Juana, are now produced partly from locations on the east side of the lake belonging to Mene Grande, Creole, and Shell. Mene Grande has a concession strip along the coast, plus other blocks to the south and in the lake. Creole has considerable acreage bordering that of Mene Grande, while Shell has areas still farther out in the lake. Richmond's concessions extend out from the west shore. These were converted from exploration concessions about 2 years ago, and the company now has in the lake itself a number of checkerboarded concession blocks.

Venezuela's New Record

Creole Petroleum Corp.'s operated production in Venezuela rose to a record level in June, the Caripito refinery processed nearly 70,000 bbl. daily, and rigs running during the month were unchanged at an average total of six.

The company reported operated production averaged 671,703 bbl. daily compared to 545,642 bbl. daily in May. The operated production total consisted of 522,194 bbl. daily from Lake Maracaibo, 3,564 bbl. daily from Cumarebo, and 145,945 bbl. daily from Eastern Venezuela.

Creole's net production plus purchased royalty oil in June amounted to 706,162 bbl. daily. This compared to 570,928 bbl. daily in May. June was a record month for practically all Venezuelan producers and resulted in especially sharp increases as compared to May when an oil workers' strike cut into output.

Crude refined at Caripito averaged 69,130 bbl. daily in June while crude runs at Amuay were 53,168 bbl. daily. The company completed four wells, all field wells, two of them in Maracaibo at 4,935 ft. average depth and good for 1,023 bbl. daily initial production. The other two were in Quiriquire at average total depth of 4,165 ft.

Chilean Personnel Change

Fernando Salas, who has headed the oil program of Chile's Corporacion de Fomento as technical adviser for petroleum, has been appointed general manager of the new Empresa Nacional del Petroleo (ENAP).

Salas is well known in the United States since he was prior to 1947 second in charge of Corfu's office in New York. ENAP is the new Chilean Government's organization established under a recent law to carry out the country's oil-development program and which now handles the indigenous production in Tierra del Fuego. Formerly this was under Corfu.

Enrique Villavicencio has been made manager of the Punta Arenas office in charge of the field work. Top management of ENAP includes Eduardo Simian, operations; Osvaldo Wenzel, exploration; and Fernando Reich, projects. Luciano Claude, head of the department of power and energy of Corfu, also serves as technical adviser to ENAP.

Peruvian Market

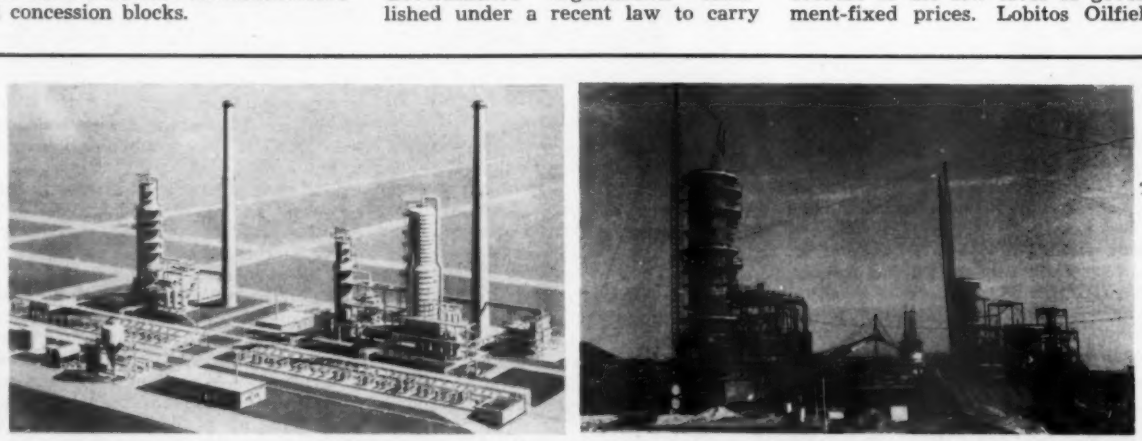
Argentine buys 1,000 bbl. daily; home sales ruinous

SALES of Peruvian crude oil by the Peruvian Government oil organization, Empresa Petrolifera Fiscal, to Yacimientos Petroliferos Fiscales, Argentine Government oil concern, are expected to be equivalent to about 1,000 bbl. daily during the current year.

The Peruvian Government recently authorized E.P.F. to sign a contract for the sale of an additional 254,000 bbl. to Y.P.F. This and the 123,000 bbl. sold in April brings the total to 377,000 bbl. for this year. It was announced that E.P.F. will use the 16,400,944 soles (about $1,080,000) to develop the oil industry.

E.P.F.'s own production amounts to between 300 and 400 bbl. daily out of a total Peruvian output of slightly more than 40,000 bbl. daily. The oil sold to Argentina represents this production plus royalty from the operations of Cia. Petrolifera Lobitos.

Lobitos Oilfields, Ltd., recently pointed out the difficulty of marketing petroleum products in Peru itself because of the low level of government-fixed prices. Lobitos Oilfields



***FAWLEY PROGRESS.**—Work is progressing rapidly on the new refinery of Anglo-American Oil Co., Ltd., at Fawley, England, which with a capacity of 126,000 bbl. daily will be the largest in Europe. The drawing shows how the crude-distillation units will appear when completed, and the photograph shows the present condition of the 60,000-bbl. two-stage unit, right, and the 66,000-bbl. single-stage unit, left. The drawing shows roadways for mobile maintenance and, lower left, the copper chloride unit for treating light naphtha. Foster Wheeler Corp. has the contract and expects to put the plant on stream by the end of next year.*

controls Cia. Petrolifera Lobitos which produces about 8,300 bbl. daily from fields in northern Peru.

In his recent annual statement in London, the company chairman called attention to the fact that Lobitos early last year was compelled by the government to assume its share of meeting the domestic market requirements. The market previously had been supplied almost wholly by International Petroleum Co., Ltd., the principal Peruvian producer. Lobitos now has its quota of crude for the domestic market refined locally.

"Selling prices of petroleum products are fixed by the government," the Lobitos chairman said. "Unfortunately they are so low that the net return is well below the cost of production of the crude oil so consumed. In fact, no increase has been allowed to the producer-refiner on gasoline for about 22 years.

"Producers have for some time made representations to the Peruvian Government for increased prices to conform with world prices. We can only hope that these representations may have effect."

Mexican Drilling

Seventy rigs now active, ten more ready to start

A TOTAL of 70 rigs of all types, including 15 belonging to five Mexican and American contracting companies, are now operating in Mexico.

This total will soon be augmented by 10 new rigs which Petroleos Mexicanos is now buying from United States suppliers. Vicente Fuentes, head of the drilling department of Pemex, has been in New York recently arranging for the rig purchases.

Pemex itself is now operating 55 rigs, including 15 on workover jobs. Of the drilling rigs, 10 are being used on wildcat locations. The new rigs being bought consist of five Wilsons and five Cardwells.

Fuentes pointed out that the present total of rigs running in Mexico represents an increase of 20 to 25 in the last year or 18 months. The new rigs will be used principally to widen the scope of Pemex's exploratory operations. Wildcat drilling at present includes the Isthmus area, four rigs; Ebano, two rigs; Cerro Azul, two rigs, and northeast Mexico, two rigs.

Besides Mexican American Independent Oil Co., which is using two rigs in the Isthmus area, contractor operations in Mexico include Wiegand Brothers, San Antonio, three rigs in Ebano; Lasso Brothers, four rigs in Ebano; W. Smith, four rigs in Cerro Azul; and Latino-Americano, two rigs in Poza Rica.

The drilling program which was begun about 2 years ago by Pemex in cooperation with Cities Service Oil Co. on a large area along the coast in northeastern Mexico has been finished. Four wildcat wells were drilled with some shows of oil but no commercial production was obtained. The rigs have been moved out of the area. This exploration was carried out on a former undeveloped Cities Service concession block.

French casing.—Pemex has obtained considerable quantities of casing from European sources. About 20,000 tons has been received and used from France. Fuentes said experience showed that this pipe, of A.P.I. specifications, was completely satisfactory and up to American standards. Pemex is still scheduled to receive about 10,000 tons of casing from Germany.

In the last year, Pemex drilling has resulted in the discovery of two fields in northeastern Mexico and further extensions of Poza Rica. In northeastern Mexico, oil has been found in Monterrey field where a gas well was drilled last year. Cano field, between Reynosa and Matamoros, now has two producers with two rigs running.

Two separate producing areas under development in the Poza Rica section are Escolin and Presidente Aleman. Neither has yet been completely defined, and it is not known if they are continuous with Poza Rica itself. Twelve rigs are being employed on this area adding to the 15 producers drilled in the last year and a half. The wells are drilled between 8,500 and 9,000 ft. and are completed for an economic production of between 600 and 800 bbl. daily. Other new production is being developed in the Alazan-Cerro Azul area where extensions to the older fields are being made.

Amazon Well Started

The Conselho Nacional do Petroleo of Brazil has commenced an important exploratory well in the Amazon River delta area southwest of Belem.

The Limoeiro well is being drilled north of Cameta on the west side of the Rio Tocantins about 120 km. southwest of Belem. Drilling & Exploration Co., Dallas, which has done other drilling for the Brazilian government oil organization, is in charge of the Limoeiro well.

Gen. Joao Carlos Barreto, conselho president, said the test would cost approximately $1,000,000. He cited reports from DeGolyer & MacNaughton that there are some 3,000 m. or more of sediments in an area crossing Marajo Island and extending south and east.

The Limoeiro well, the first drilled in the area, follows seismic work and gravity and magnetometer surveys by American contractors. The new rig being used, General Barreto said, has a capacity of at least 3,000 m. (about 10,000 ft.) depth. Besides this new test, the conselho is surveying possible oil areas farther up the Amazon River.

EUROPE

Sicilian Venture

Gentle structure, surface signs draw Gulf concession

THE American International Fuel & Petroleum Co., a Gulf Oil Corp. subsidiary, has negotiated a concession contract with the regional government of Sicily covering 100,000 hectares in the southeastern part of the island.

Obligations called for under the contract date from official publication of the contract which is expected in the near future. The area involved lies between Ragusa and the ancient port of Siracusa. In this region there are occurrences on or near the surface of sands containing heavy oil with indications of gentle structure.

The contract is the first negotiated under the new Sicilian petroleum law which became effective March 21, of this year *(The Oil and Gas Journal, May 4, page 74, and May 18, page 111)*. MacMillan Petroleum Corp., Los Angeles, which has been interested in Sicily for several years, holds permits and applications totaling nearly 400,000 hectares under the 1927 law, and can convert a maximum of 100,000 hectares to terms of the new legislation.

The Gulf contract provides for three exploratory periods totaling 8 years and 9 months. Rental during the exploratory phase is 100 lire (625 to the dollar) per hectare per year. If stipulated work obligations are fulfilled during the first 2-year and 9-month period, a 3-year extension can be obtained with the size of the area automatically reduced by 20 per cent. Provision is made for a second 3-year extension with another 20 per cent reduction in the original area.

The company has the right to apply for an exclusive exploitation concession on the discovery of a minimum of 100 bbl. daily of oil or 525,000 cu. ft. daily of gas. Rental on the area taken in the exploitation concession is 500 lire per hectare per year.

Long-term concession. — A 30-year term for the exploitation, or production, concession is specified, and the regional government is committed to give favorable consideration to an extension. Royalty is on a sliding scale based on average daily production in a calendar year. This ranges from 7 per cent for production from 1 to 5,000 cu. m. (6.3 to 31,500 bbl.) on up to 12 per cent for daily average production from 1 to 100,000 cu. m. (6.3 to about 630,000 bbl.). In the event the company is found to qualify for income-tax exemption as a new industrial enterprise under other recent Sicilian legislation, royalty is

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increased by 10 per cent of the royalty, thus, for example, raising the 7 per cent figure to 7.7 per cent. A 10 per cent flat royalty is provided for gas production.

The company can renounce all or any part of the concession area at any time with the regional government given the option to purchase the equipment used. The contract calls for 60 per cent of the work force to be Silician during exploration, and 65 per cent Sicilian during the exploitation phase.

The Gulf organization already has done geological and airborne magnetometer work over the area. The work program called for in the first exploratory period under the contract, includes the airborne magnetometer survey, supplementary geological studies, at least four core holes started within 2 years, and one deep test started within 3 years and carried to a minimum depth of 2,000 m. (6,550 ft.).

Italian Contract

Ten-fold increase given in new equipment order

A CONTRACT for a 100,000,000-cu. ft. capacity gasoline - extraction plant and the supply of equipment has been awarded by Azienda Generale Italiana Petroli, government-controlled Italian oil company.

A contract for the project and the supply of all equipment has been obtained by North American Petroleum Gas Corp., New York, according to Virgil Stark, North American president. The company is cooperating with J. F. Pritchard & Co., Kansas City, which recently sent E. Frye, a project engineer, to Italy to inspect the plant site and local conditions, Stark said.

The gasoline plant ordered by AGIP will extract from the natural gas available at 1,800 psi. well-head pressure condensable hydrocarbons which would otherwise give trouble in gas-transmission lines. The plant will be of modern design using the pressure drop of the natural gas for refrigeration of the absorbent and will be independent of outside utilities, producing its own electricity and steam by using plant waste products.

In addition to the dehydrated natural gas amounting to some 35 billion cubic feet a year, AGIP will obtain from the plant such products as propane (with 75 per cent extraction 12,500,000 gal. a year), butane (with 98 per cent extraction 9.000,000 gal. a year), gasoline (with 100 per cent extraction 22,000,000 gal. a year), and other distillates (5,000,000 gal. a year).

Large gas reserves.—Stark pointed out AGIP has found large quantities of natural gas in Cortemaggiore field in northern Italy. Estimated gas reserve of the field is approximately 3 trillion cubic feet. Gas production has trebled from last year's output of approximately 20,000,000 cu. ft. daily, and is expected to be about 200,000,000 cu. ft. daily in a few years. The new gasoline plant will serve Cortemaggiore field. Stark said AGIP intended, only a few months ago, to order the plant for a capacity of 10,000,000 cu. ft. daily but decided afterwards to place the order for a capacity of 100,000,000 cu. ft. daily.

North American Utility & Construction Corp., of which Stark is also president, has obtained contracts for equipment for other gas-utilization plants in Europe. These include generator equipment to reform natural gas for Edison in its Milano plant, and a catalytic generator plant for Italgas in Venice, both of which are the first of their kind in Europe.

Pibigas (Idrocarburi e Affini S.p.A.) has ordered from North American Petroleum Gas 36 propane storage and filling stations in a program which reflects the rapidly developing utilization of L.P.G. in Italy. *(The Oil and Gas Journal, August 17, page 71.)*

Design British Refinery

The 20,000-bbl. daily capacity refinery which Socony-Vacuum Oil Co., Inc., and Powell Duffryn, Ltd., have announced they will build in England is now in the design stage.

Construction work is expected to get under way probably late this fall. Lummus Co., Ltd., has the contract. The refinery will be a complete processing unit, though specializing in the production of lubricating oils. The plant site will be at Coryton, about 25 miles below London Bridge on the Thames, where Cory Brothers & Co., Ltd., a Powell Duffryn subsidiary, now operates an oil-blending, treating, and storage plant.

First Jutland Well Fails

The 1 Frederikshavn test in northern Jutland which Danish American Prospecting Co. spudded July 3 of this year has been completed at 4,319 ft. as nonproductive.

This well is the first to be drilled under terms of the new concession contract which became effective in June. The old concession was cancelled, and the new agreement negotiated by the Gulf Oil Corp. affiliate and the Danish Government.

The company's present program in Denmark looks forward to continued exploratory effort in the numerous salt domes and many other type structures which have been outlined. In the near future, it is planned to resume drilling in the 1 Gassum well in central Jutland. This test, that started March 20, 1948, and suspended in February 1949 at 9,955 ft., will be taken deeper with an objective in possibly the 12,000-ft. range.

Three rigs are being used in the program, a Cardwell of about 5,000-ft. capacity, an Emsco of 10,000-12,000-ft. capacity, and a Sullivan structure drill of about 2,500-ft. capacity. Structure drilling and seismograph work continued without interruption during the recent concession negotiations, although the deeper tests were held in abeyance.

Dapco's work in Denmark dates back to 1938. Its program was halted by the German invasion and resumed in 1946. Two deep wells were drilled under the old concession, the Vinding in central Jutland, which was taken to just under 8,000 ft. about 2 years ago, and the Suldrup No. 6, near Aalborg, in north-central Jutland, which went to about 5,000 ft.

Power Resource Survey

A proposal that the United Nations set up an economic bureau to maintain an inventory of world resources, including petroleum, was made last week in Birmingham, England, by a well-known British scientist.

At the 112th meeting of the British Association for the Advancement of Science, Sir Harold Hartley said such an inventory would help coordinate resources that are haphazardly distributed geographically and thus aid in meeting ever-growing demand.

Of the world's energy resources, he said, countries north of 20 N. Latitude contain 94 per cent of the world's coal and 83 per cent of the oil reserves, while those to the south have two-thirds of the world's water-power potential. If the world's water-power reserves were all developed, he said, their total production would be equal to all fossil fuel energy in use today.

FAR EAST

Indian Earthquake Damage

The violent earthquake which recently occurred in northeast India caused some damage, as yet not fully known, to installations of Assam Oil Co., Ltd., in the Digboi area.

Digboi field in Upper Assam, which produces more than 5,000 bbl. daily, was shaken by quakes through the week of August 18. For a time, physical communication between the company's Digboi headquarters and the outside world was cut off, and subsequent shocks halted all rail and road distribution of products from the Tinsukia installation.

According to preliminary reports in Calcutta, the earthquakes caused damage to some of the company's tankage. No casualties were reported among the company's staff or labor force. Assam Oil is a subsidiary of Burmah Oil Co., Ltd. It produces India's only domestic production and operates a 5,750-bbl. refinery at Digboi.

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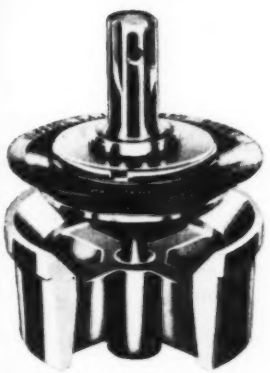

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Superintendent

Cravens receives promotion at Cities Service (Del.)

WILLIAM T. CRAVENS, Bartlesville, Okla., has been named general superintendent of the refinery operations of Cities Service Oil Co. (Del.), under Lee N. Haugen, manager of the refining division.

Cravens has been assistant general superintendent since June 1949. He obtained a degree in chemical engineering from the University of Arkansas in 1936, and joined the Cities Service organization the following year. His first assignment was with Arkansas Fuel Oil Co., a Cities Service affiliate, at Shreveport, La., and later served on the staff of the company's chief engineer. In 1939 he was promoted to refinery engineer of the company's refinery at Boiser City, La.

In 1941 Cravens was moved to the New York offices of the parent Cities Service Co. to work on the design of the huge refinery then projected for Lake Charles, La., and from 1942 to 1947 he served as chief process engineer of Cities Service Refining Co. at Lake Charles. He then was returned to New York as chief process engineer of the manufacturing department of Petroleum Advisers, Inc., service organization of Cities Service, where he worked on the design of the Cit-Con lubricating-oil plant at Lake Charles, jointly owned by Cities Service and Continental Oil Co., and on modernization of the Cities Service refinery at East Chicago, Ind. He was then transferred to Bartlesville where he has been working on modernization and enlargement of the Ponca City, Okla., refinery of Cities Service Oil Co., a project just announced by the company.

R. W. Minckler, president of General Petroleum Corp., Los Angeles, Calif., has been appointed chairman of the Western Oil and Gas Association's new committee on federal affairs. Other members are **T. S. Petersen,** president of Standard Oil Co. of California; **Torrey H. Webb,** vice president of The Texas Co.; **C. P. Watson,** vice president of Seaboard Oil Co.; and **C. A. Johnson,** president of Holly Development Co., Los Angeles.

P. V. Rome has been named manager of the Louisiana Division of Esso Standard Oil Co. to succeed **J. C. King** who becomes marketing consultant for the southern region, which embraces Virginia, North and South Carolina, Tennessee, Arkansas, and Louisiana. The appointments are effective September 1. **H. J. Geiger,** assistant division manager in the Arkansas division, has been named to succeed Rome as assistant division manager in Louisiana.

Walter F. Winters, formerly special projects engineer for the Asphalt Institute at Denver, has been promoted to chief engineer in New York City.

William W. Nichols has been promoted to the position of analyst in the Bayonne, N. J., refinery of Tide Water Associated Oil Co. He is affiliated with industrial relations department.

Jack Morgan, Brookhaven, Miss., junior petroleum engineer with Sun Oil Co., has been transferred to Delhi, La.

Willie F. Parson has joined the Sun Oil Co. as a paleontologist in Dallas. Tex.

F. W. Mueller has been appointed head of the geology and land departments, Heep Oil Co., Austin, Tex. He formerly served as chief geologist with P. R. Rutherford, Houston, Tex.

C. C. Bradley has been appointed assistant general manager for Imperial Oil Co., Canada. **C. T. Wright** has been advanced to general operations manager. Both positions have been newly created.

Mead L. Bricker, director of Ford Motor Co., and **Otto A. Seyferth,** president of the U. S. Chamber of Commerce, have been made directors of Mid-West Refineries, Inc., Grand Rapids, Mich. Until recently Bricker was vice president of Ford. Seyferth is president of West Michigan Steel Foundry Co., Muskegon.

William C. Whaley, newly elected vice president in charge of Sunray Oil Corp.'s California division, has appointed **R. E. Foss** manager of production operations; **T. H. Acres,** engineer in the gas and gasoline department; **O. A. Graybeal,** reservoir engineer; **T. J. Prehoda,** drilling superintendent; **D. L. Caldwell,** drilling department engineer; **F. W. Borden,** production superintendent; **M. C. Welch,** superintendent, mechanical department; and **E. B. Closson,** superintendent.

J. R. Bailey, formerly refinery engineer, has been promoted to director of natural-gasoline and gas operations by Continental Oil Co. He was advanced from assistant director, replacing **F. B. Haverfield,** resigned. Joining Continental in 1927, he entered the Glenrock, Wyo., refinery from which he was transferred to the Baltimore, Md., refinery, and later to district engineering work in Louisiana. He was successively division engineer in natural-gasoline and gas operations, superintendent of development, and in 1949 became assistant director. **C. L. Ritter,** former superintendent, has been promoted to assistant director succeeding Bailey. His advancements carried him from Lance Creek, Wyo., to Tepetate, La., Houston, Tex., and Ponca City, Okla. Announcement of the promotions was made by **E. W. Webb,** Continental production-department manager.

F. M. Willenburg, Shawnee, Okla., assistant division manager in charge of the southern Oklahoma districts of Service Pipe Line Co., was transferred to Fort Worth as assistant division manager of its Central and East Texas division, under **J. J. Hill,** division manager. **H. C. Jones,** Shawnee, assistant division manager of the company's northern Oklahoma districts, was assigned to take Willenburg's place in southern Oklahoma, and **W. N. Stivers,** Casper, Wyo.,

S. L. COX

C. F. GEARHART

W. N. STIVERS

PERSONALS

district superintendent of the Wyoming division, was promoted to fill the position vacated by Jones. Stivers and Jones will work under **J. E. Polston,** Oklahoma division manager. **S. L. Cox,** Casper, area engineer for the Wyoming and Nebraska divisions, was promoted to district superintendent, replacing Stivers. **C. F. Gearhart,** Tulsa, senior engineer, was promoted to area engineer, replacing Cox at Casper. Both report to **R. R. Strand,** Wyoming division manager. **Ellis Orr,** Carrollton, Mo., industrial-relations supervisor in the company's Missouri and Illinois divisions, was transferred to Drumright, Okla., as assistant to **J. E. Laughorn,** district superintendent.

F. H. MATTHEWS

Fred H. Matthews, Oakland, Calif., has been named manager of the crude and products department of the western division of Tide Water Associated Oil Co., succeeding the late Harry T. Earl. He will be in charge of purchases and exchanges of crude oil and products and will be a member of the division's operating and production committees. Matthews started with Tide Water as an office boy in 1913 and has held many positions with the company, his latest being assistant to Earl.

S. G. Stiles, mechanical engineer for Shell Oil Co., Long Beach, Calif., has been transferred to Tulsa as division engineer.

John M. Mintz, junior field engineer for Tide Water Associated Oil Co., is promoted to senior field engineer at Hobbs, N. M.

Harvey D. Spires, district engineer at Kamay, Tex., for Tide Water Associated Oil Co., has been transferred to Chickasha, Okla., as district foreman.

Harry E. Speaker, driller and lease foreman at Canton, Kans., has been made foreman and partner of H. & M. Drilling Co., North Baltimore.

R. M. (Bob) Knoepfel, Carlsbad, N. M., has been appointed geological scout for Atlantic Refining Co.'s district office at Roswell. The district office has land, geological, geophysical, and scouting departments.

George B. Randels, general superintendent of the northern division of Interstate Oil Pipe Line Co., Tulsa, has been loaned to Interprovincial Pipe Line Co., to assist in getting into operation the 1,150-mile pipe line now being constructed from Alberta to Superior, Wis. His headquarters will be in Edmonton, Alta., and he expects to be there about a year. Randels' pipe-line career began in 1918 with Oklahoma Pipe Line Co., a predecessor of Interstate. After serving with Interstate in several positions in Oklahoma and Illinois, he was brought to Tulsa in 1941 as division superintendent in charge of Oklahoma operations.

Jack Hodges is superintendent of pipe-line construction for Price-Morrison Co. at Linden, Tenn. The firm is building a 100-mile, 30-in. natural-gas line.

Ralph B. Ross, former geophysical supervisor at Tulsa, has been made assistant director, geology division, of Gulf Research & Development Co., Pittsburgh.

J. C. Wells has been advanced to assistant district superintendent of drilling and production for Richardson & Bass Co., Pointe a la Hache, La.

H. F. Thompson, former party chief for Atlantic Refining Co., has organized Thompson Drilling Co., Lovington, N. M.

J. C. Rector, assistant to the manager of field operations at Whittier, Calif., for Union Oil Co. of California, has been transferred to Los Angeles as supervisor of gas contracts in charge of gas operations and economic problems.

Edwin J. Kieth, chief of seismograph party, Continental Oil Co., has been transferred from Seminole, Tex., to Carlsbad, N. M.

G. W. Hart, former refinery superintendent at Lebec, Calif., for General Petroleum Corp., has been transferred to Vernon, Calif., as superintendent of measurement in charge of supervision of metering.

J. S. Allen has retired as engineer for Texas Empire Pipe Line Co., Oil City, Pa.

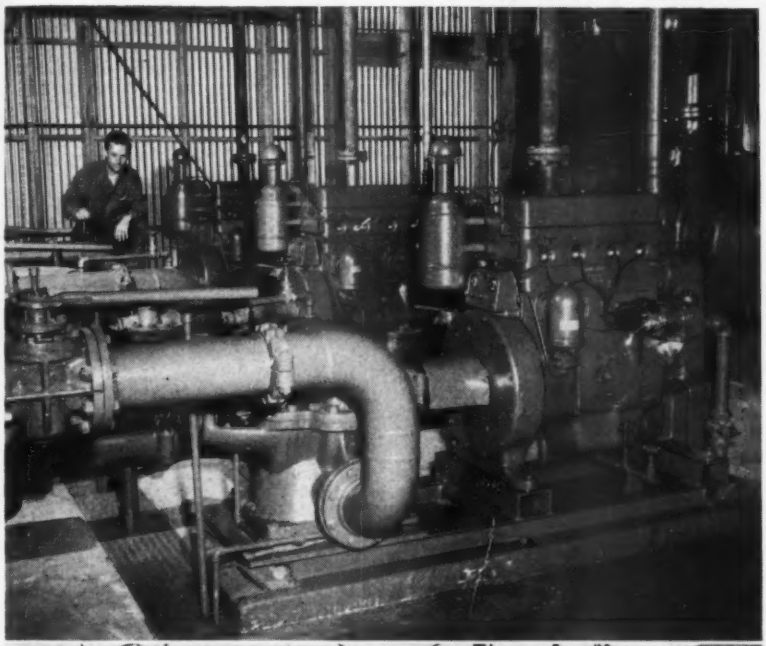
Floyd H. Miller, production geologist for Gulf Oil Corp., has been transferred from Kermit, Tex., to Goldsmith, Tex.

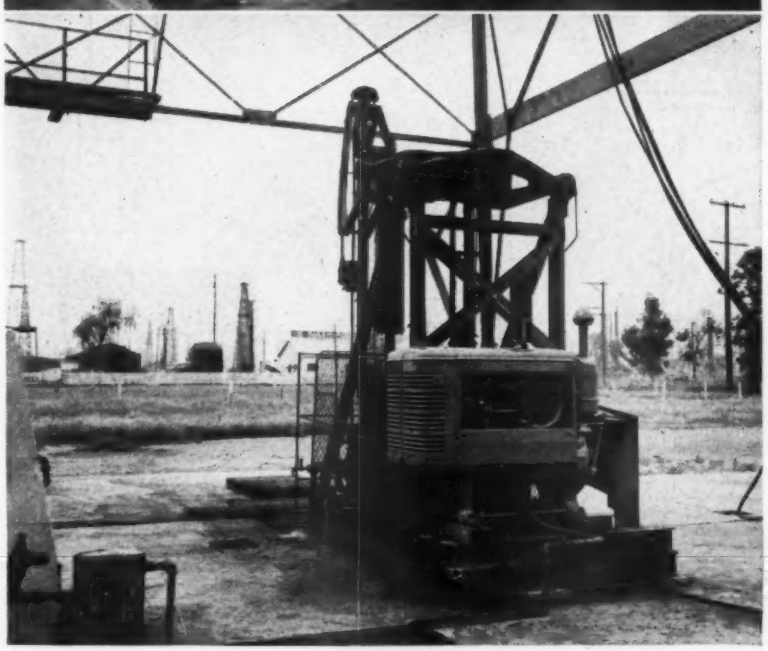
Orlin W. Lyons, district manager for Dowell Incorporated, Shreveport, has been appointed to the management staff of Brazos Oil & Gas Co., Houston. He is succeeded by **Floyd Carr,** development engineer for Dowell Perfo-Jet Services, Tulsa. Both companies are subsidiaries of Dow Chemical Co.

J. J. Horigan, president of Lago Oil & Transport Co., Aruba, N.W.E., has been honored by Queen Juliana with a royal decoration as Officer in the Order of Oranje-Nassau. Presentation was made by Gov. L. A. H. Peters, Curacao. Horigan has been associated with Standard Oil Co. (N. J.) since

***ROCKY MOUNTAIN OIL OFFICIALS.**—Seated at the chairman's table at the joint session of the public lands, legal, and legislative committees of the Rocky Mountain Oil and Gas Association held in Denver recently are: Donald F. McMahon, secretary; Charles S. Hill, Denver, independent producer, vice president; R. D. Townsend, Casper, General Petroleum Corp., chairman of the public lands committee; and Richard P. Ryan, Denver, Carter Oil Co., chairman of the legal committee.*

ON ANY PUMPING JOB— THE RIGHT POWER IS INTERNATIONAL





The Brea Canyon Oil Company of Brea, Cal., agrees that the right pumping power is International. Three International U-9 engines pump water in their cracking plant vacuum room. One engine pumps cooling water for the vacuum pumps; the second U-9 pumps water for cooling coils and the third is a standby unit to insure against any possible power interruption. The engines drive six-inch turbine pumps and run twenty-four hours a day.

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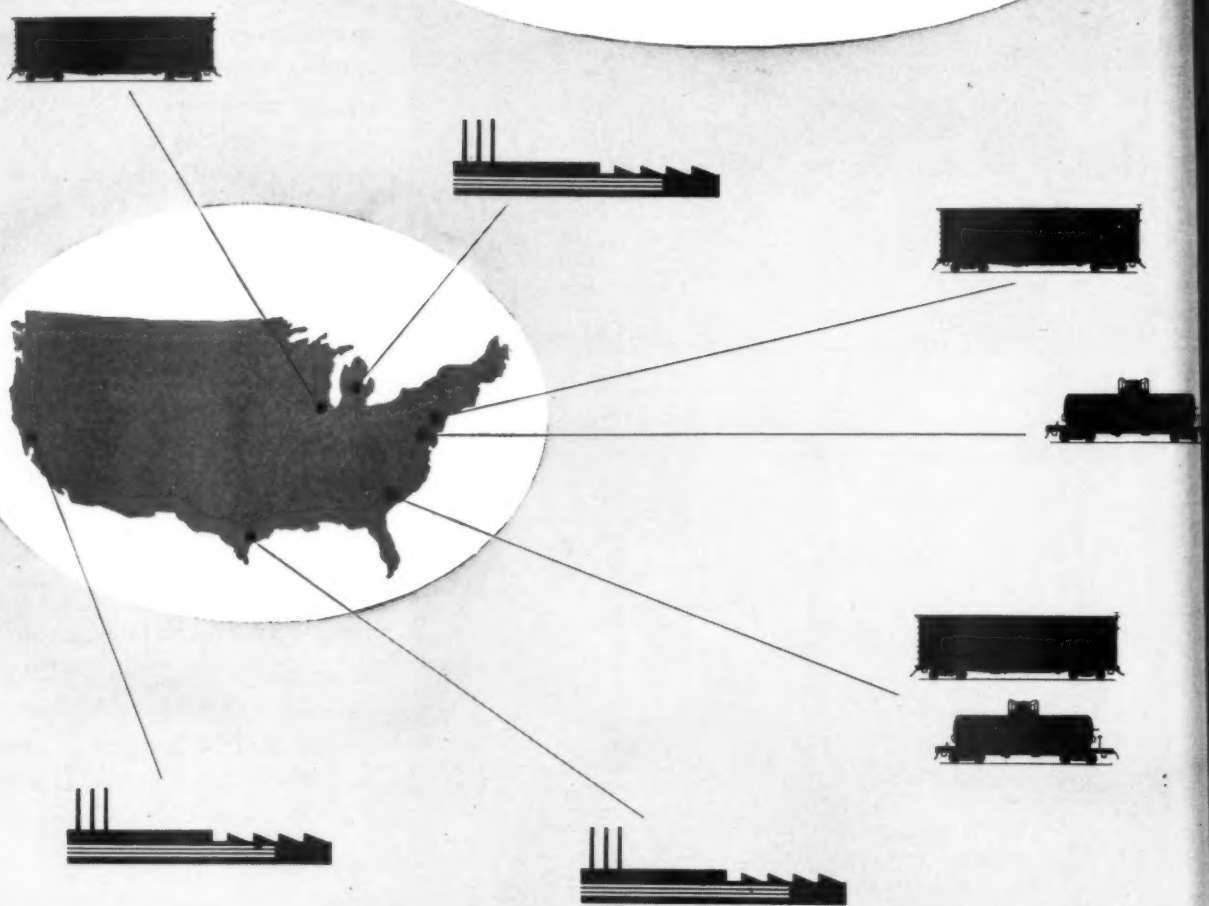

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1920, having installed and managed refinery activities in Mexico, Argentine, and Cuba.

C. E. George, former geologist with Stanolind Oil & Gas Co. in the West Texas district, has joined the division office of Anderson-Prichard Oil Corp. in Midland, working in the geology department.

R. R. (Denny) Jackson, formerly with Cities Service Oil Co., has been made head of the West Texas geological department for Signal Oil & Gas Co., at Midland, where Signal will open an area land office shortly.

Carle F. Sharp, Jr., gas engineer at Katy, Tex., for Humble Oil & Refining Co., has been transferred to Monroe City, Tex., as associate petroleum engineer.

R. E. Nystrom has been promoted to head the refining and cracking section in the refinery of Esso Standard Oil Co., Baton Rouge, La. He replaces **R. F. Howe** who was named general foreman of butyl operations in the chemical products division. Nystrom was formerly head of crude distillation and products group, and is succeeded by **J. D. Midwikis.**

A. W. Baucum of Gulf Oil Co. has been promoted to assistant to vice president in the domestic producing department. He was assistant division manager of the South Texas division, after having served as petroleum engineer of the Oklahoma-Kansas division.

Elwood L. Baldwin has been promoted from district engineer to petroleum engineer, Sun Oil Co., Roscommon, Mich.

George C. Wight has been promoted to assistant district superintendent, Stanolind Oil & Gas Co., Midland, Tex. He was assistant superintendent at the Salt Creek field, Midwest, Wyo.

William Morris, drilling superintendent for Exploration Drilling Co., Washington, Ind., has been transferred to the home office from Terre Haute, Ind.

W. L. Kennedy, Jr., Tulsa, has been transferred from hydraulic engineer in the engineering department to planning engineer in the planning and economics department of Service Pipe Line Co. **L. E. Anderson,** Tulsa, has been made hydraulic engineer for the company.

John W. Peret, Midland, Tex., foreman for Sun Oil Co., has been transferred to Colorado City.

Donald C. Brown, Odessa, Tex., Sun Oil Co., has been promoted from junior petroleum engineer to field engineer.

E. O. Moore, Premont, Tex., toolpusher for Sun Oil Co., has been transferred to Colorado City.

Irving M. Griffin, Jr., consulting geophysicist, has returned to Houston where he maintains offices, after being in Rock Springs, Wyo., on consulting work since June.

Edward Graff, formerly secretary to the exploration division of Socony-Vacuum Oil Co. of Venezuela in Caracas, has been appointed secretary to the geological division of Socony-Vacuum Oil Co., Inc., in New York.

Kenneth E. Hard, research engineer with Magnolia Petroleum Co., has been transferred to the company's production-research laboratory at Dallas, from Compton, Calif.

Stanwood Howes, formerly terminal superintendent for Mene Grande Oil Co. at Puerto La Cruz, Venezuela, has been appointed chief oil dispatcher of the foreign production division of Gulf Oil Corp. in New York. He succeeds **W. J. Hanna** who retired after 47 years of service with Gulf.

J. R. White, a director and vice president of Imperial Oil, Ltd., since 1945, has been appointed executive vice president of the company. The company at the same time announced the resignation of **H. H. Hewetson** as a director and chairman of the board. Hewetson recently was elected a director of Standard Oil Co. (N. J.). White, the new executive vice president, joined Imperial at Sarnia, Ont., in 1933 as draftsman and engineer. He went to the United States in 1937 and in 1938 to Standard Oil Co. of Venezuela, becoming vice president of that company in 1942. Two years later, he returned to the Imperial organization.

H. H. HEWETSON

DEATHS

Ed H. Moore, 78, independent oil producer and formerly U. S. Senator from Oklahoma, died in Tulsa September 2. Moore entered the oil industry in 1919, and organized Independent Oil & Gas Co. He sold the firm to Phillips Petroleum Co. 11 years later, after raising its value from his original investment of $250,000, to more than $40,000,000. Moore was elected Oklahoma U. S. Senator on the Republican ticket in 1942. He retired from public office in January 1949.

Aubrey William Schofield, veteran Gulf Oil Corp. production official and acting manager of Kuwait Oil Co., Ltd., in Kuwait, was among the 55 persons killed August 31 in the crash of an airplane 60 miles northwest of Cairo. Schofield, a native of San Antonio, Tex., joined Gulf in its Houston production office in 1924.

Gerald Hampton Threadgill, 50, Texas Pipe Line Co., died at Beaumont, Tex., August 24.

Owen D. Story, 47, head of Shell Oil Co.'s regional purchasing and stores department, Houston, died August 27 at Los Angeles.

Cline H. Southern, 42, of Coppinger & Southern, drilling contractors, died in Larned, Kans., July 26.

William J. Healey, 76, Bradford, Pa., oil producer and founder of Healey Petroleum Corp., died September 3 in New York City. He sold his interests in the company to South Penn Oil Co. and United Refining Co. in 1948.

Edward Holden, 66, chief material controller for Foster Wheeler Corp., died August 27 in Southampton, England, where he had been working for several months in connection with the erection of the new Fawley refinery of Anglo-American Oil Co., Ltd.

Martin J. Cushmeyer, 59, who retired last April as an engineer at the Bayonne, N. J., refinery of Tide Water Associated Oil Co., after 37 years with the company, died August 30 at Roselle Park, N. J.

Bernard M. Laulhere, 64, former manager of engineering services for Southern California Gas Co., died in Los Angeles August 5. A native of France, Laulhere entered the natural-gas business in 1921.

Oscar M. Brown, 64, Tulsa, plant superintendent for Mid-Continent Petroleum Corp.'s refinery at West Tulsa, died August 16.

Walter L. Albert, Sr., 72, Bartlesville, Okla., for 43 years with National Supply Co., died August 22.

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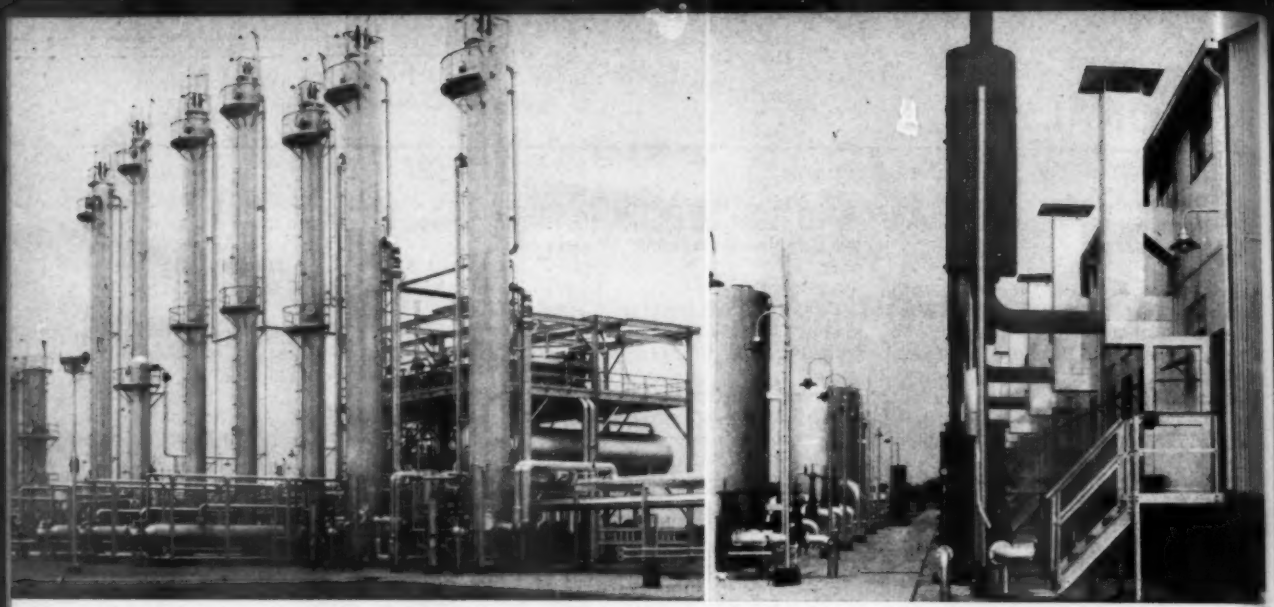


Left: View of process area showing fractionation equipment. Right: View of compressor room showing exhaust mufflers and exhaust jacket air vents.

Sholem Alechem Gasoline Plant Processing 30 Million Cubic Feet Per Day

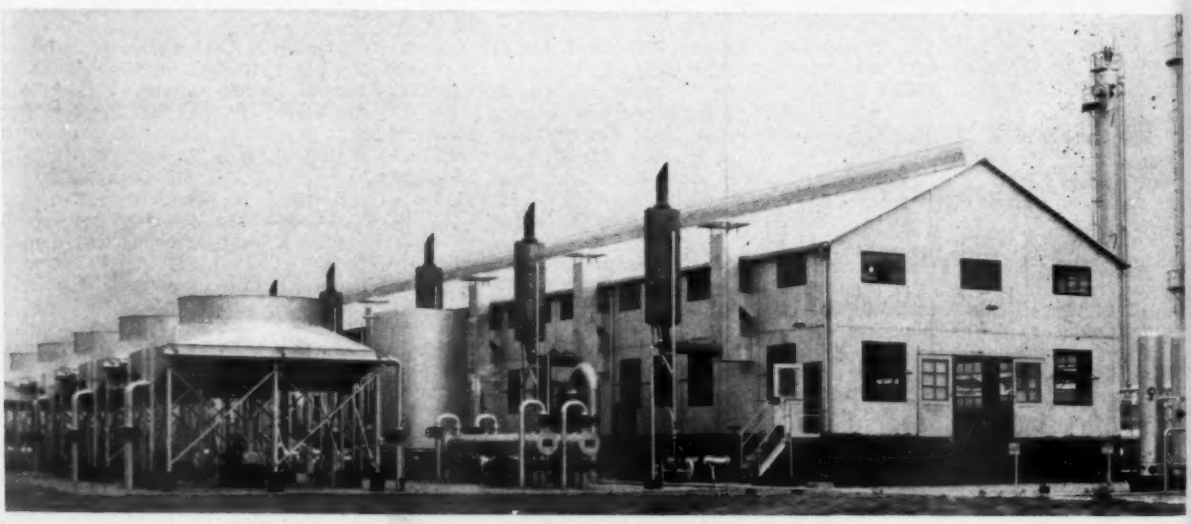
by Roy F. Carlson
Dallas District Editor

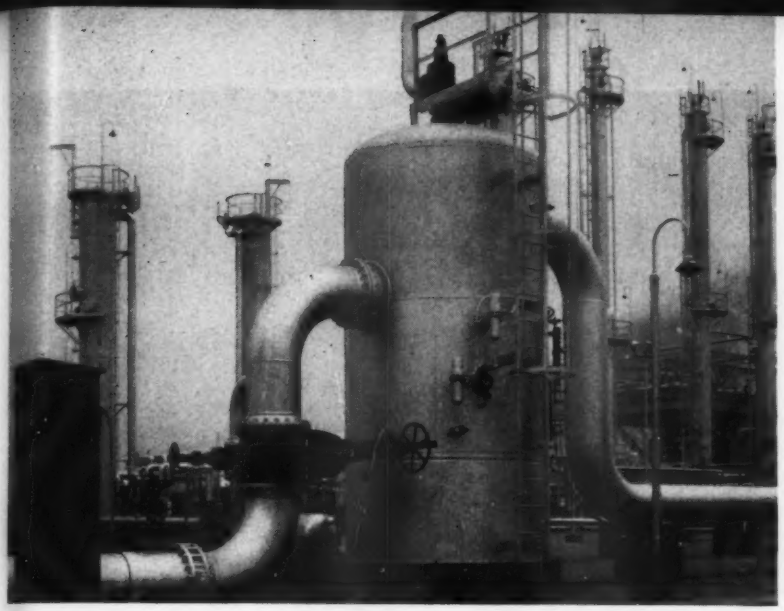
BECAUSE of an unscheduled change in field well spacing and an increase in allowable oil production, the newly completed gasoline plant operated by Magnolia Petroleum Co. for producers in Sholem Alechem field in south central Oklahoma has reached design capacity much sooner than was originally anticipated.

It was originally expected that at the time the plant was completed it would begin to process about 18,000,000 cu. ft. of gas per day—this with a gasoline content of 1.7 gal. per thousand cubic feet. Then, as the field became older and gas-oil ratios climbed with a corresponding drop in gasoline content, it was thought that the plant would reach a design capacity of 30,000,000 cu. ft. per day without a major increase in the liquid output of the plant. Design of the plant was completed on this basis.

Before any fabrication or construction was done on the plant, however, the spacing plan for the field was changed from 20 to 10 acres, and operators engaged in a rapid drilling program, raising the available gas

Fractionating equipment is located left of the compressor building in this view of Magnolia's Sholem Alechem plant.





West plant inlet scrubber, showing inlet-gas-temperature recorder at left; process equipment in background.

per day if necessary, by installation of additional compressor units.

On the 30,000,000-cu. ft. per day basis, the plant was designed to recover 64 per cent of the propanes, 98 per cent of the butanes, and essentially 100 per cent of the gasoline content.

Processes

The Sholem Alechem plant is designed to take field gas from wellhead separators at about atmospheric pressure. The gathering system collects the gas and carries it to the plant with a pressure drop of 3½ psi. The compressors take gas from the gathering system and compress it in three stages to 800 psi. Gathering-system pressure and compressor suction pressures are controlled to conform with economic dictates of gasoline-crude oil prices. Low field-separator pressures give a greater gasoline yield at the expense of crude gravity while higher separating

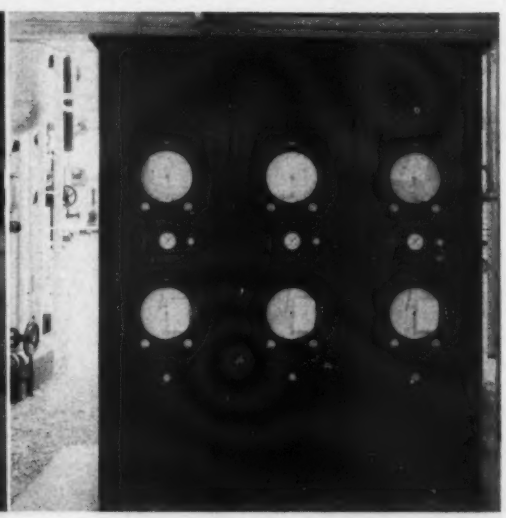
(Continued on page 93)

volume above the 18,000,000 cu. ft. planned on initially and the 30,000,000 cu. ft. per day ultimate design figure. Design for the plant was altered to meet this added gas volume by leaving room in the compressor house for more units, to be added when needed, and by using cascade-type trays in the main absorber rather than conventional bubble-cap trays. Then, further increasing the process load, Oklahoma oil allowables were raised about 25 per cent, and casing-head-gas production increased correspondingly.

At the present time, long before full development of the field, the plant is processing in excess of the originally scheduled ultimate volume of 30,000,000 cu. ft. of gas per day. According to the new design changes, however, the plant will be able to handle upwards of 50,000,000 cu. ft.

Compressor room, engine side, showing air-jacketed exhaust lines on compressor units.

Left: Covered walk and unit instrument panels in plant process area. Right: Another of the control panels located on the covered walk.



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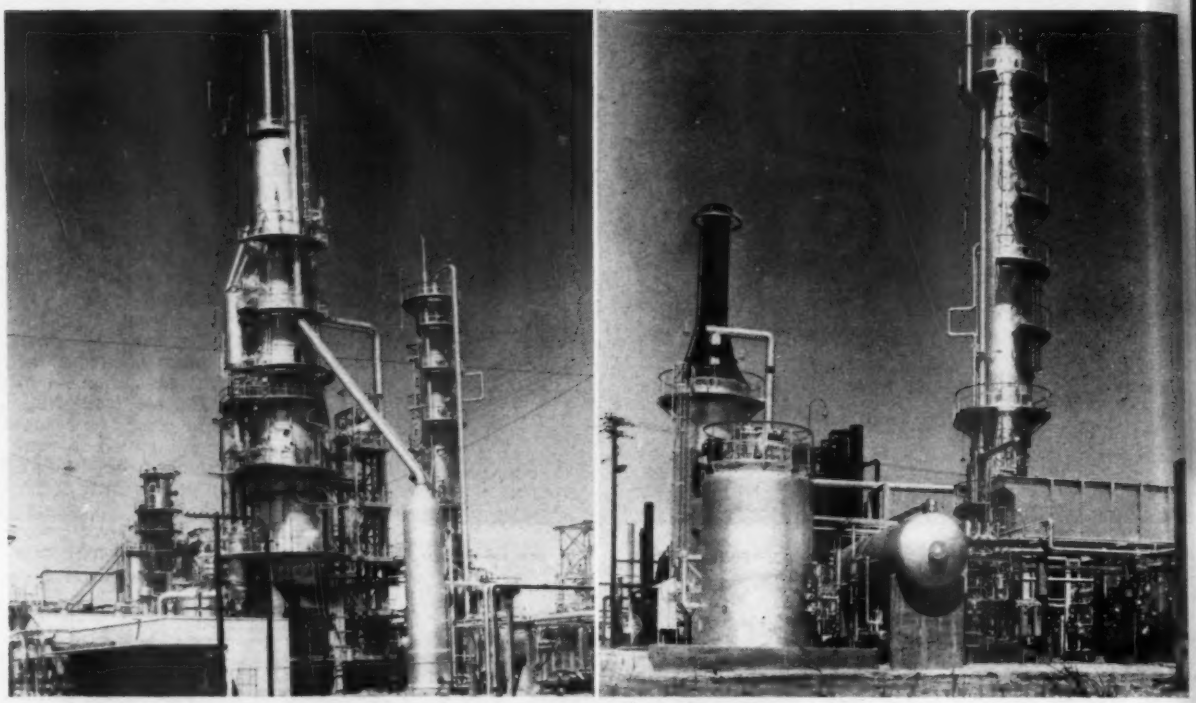
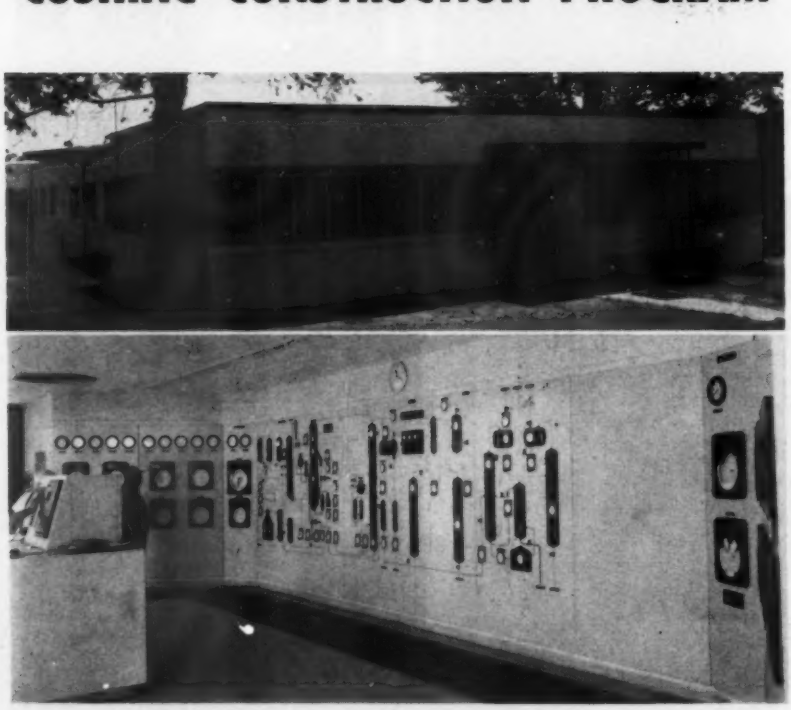


Left: The new 5,000-bbl.-daily fluid catalytic cracking plant at Cushing. Right: New electric desalting unit, foreground, and new crude unit, background.

DEEP ROCK COMPLETES LARGE CUSHING CONSTRUCTION PROGRAM



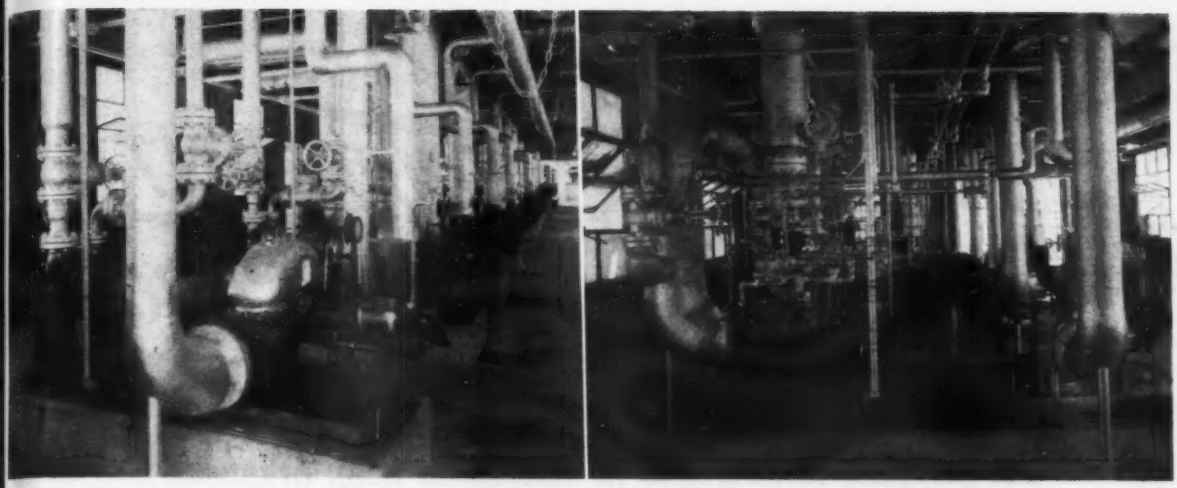
DEEP ROCK OIL CORP. has just completed a large and important construction program at its Cushing, Okla., refinery. The principal project included in the program is a new catalytic cracking plant which is geared to process 5,000 bbl. of charge stock daily at 60 per cent conversion.

A new modern crude-oil distillation unit, rated at 6,000 bbl. daily input, which raised over-all refinery crude-oil capacity by 50 per cent, was another important item on the program. This unit is the latest type and is equipped with a process for electrically desalting its crude-oil charge.

Feed stock for the new U.O.P. fluid-type catalytic cracking plant is supplied by a revised vis-breaking unit. Changeover on the unit from vis breaking to cat feed preparations was included in the general construction program.

An existing polymerization plant was enlarged to balance out with operations on the new cat cracker. Charge stock to the poly plant obtained from the cat cracker and from thermal cracking when this latter process is operated, is treated in a new Girbotol unit. This operation removes the undesirable constituents from the feed stream before it is processed in the poly plant. Treatment in the Girbotol operation is liquid phase. The treating unit and changes in the existing poly plant

The recently completed modern research lab building located adjacent to refinery, and, left, graphic control panel for Deep Rock's cat cracker and associated processes.



Pumping equipment for the new operations at Deep Rock's Cushing refinery.

were also a portion of the over-all construction program at Cushing.

In addition to new processing units and revisions to existing units, the recently completed construction program included a new cooling water system, an increase of 30 per cent in the refinery's steam-generating capacity, and the addition of 200,000 bbl. of storage. The new cooling-water system operates automatically and connects the refinery with adequate sources of supply, the Cimarron River about 7 miles distant and the city of Cushing.

Engineering services for the program were supplied by Universal Oil Products Co. and The Refinery Engineering Co. Construction of the major units was handled by Jones & Laughlin Supply Co. and Refinery Engineering Co. Formal dedication of the plant is set for September 12.

DEEP ROCK IS INTEGRATED OPERATION

DEEP ROCK OIL CORP. is an integrated oil operation and has a 30-year background in the Mid-Continent area. It performs all processes from locating and producing the crude oil to marketing the finished products. The company was incorporated in 1919 as Shaffer Oil & Refining Co. The properties were purchased from C. B. Shaffer & Associates. At that time the company was a subsidiary of Standard Gas & Electric Co.—a public-utility firm.

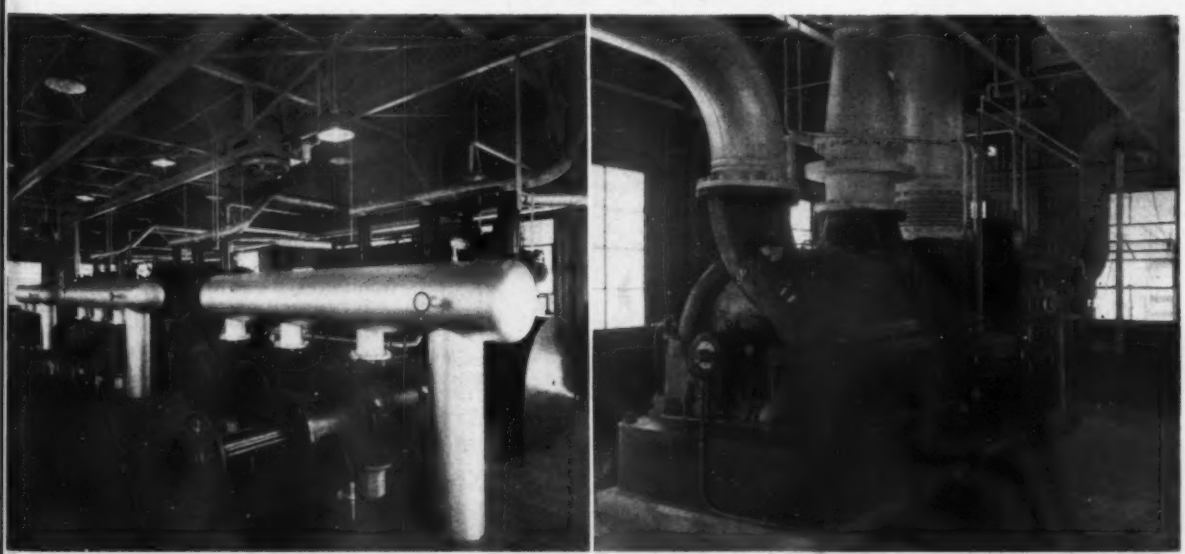
Important from a production and sentimental standpoint is Cushing field, the real birthplace of Deep Rock. The company's first president, C. B. Shaffer, drilled the discovery well of this early Oklahoma oil field.

Crude-oil pipe-line property included in the 1919 purchase was a small gathering system with a 4-in. main line from the Wheeler discovery lease in Cushing pool. As producing areas spread, other pipe-line gathering systems were added.

In 1942 Deep Rock obtained use of the Great Lakes Pipe Line Co. system. Now, nearly all of its gasoline and heating-oil products are sent through this pipe line. Tank cars are still used to handle the bulk of lube oil, naphthas, and other products.

The marketing division distributes the company's products under the trade mark "Deep Rock."

Left: Compressing equipment in the new gas-concentration plant located adjacent to the cat unit. Right: The blower installation, a component of the new catalytic cracking operations at Cushing.



XUM

ELECTRICAL EQUIPMENT INSTALLATIONS

For pumping installations in Smackover field, Arkansas

by W. C. Best

THE Smackover oil field, located in Union and Ouachita counties, Arkansas, covers approximately 40 sq. miles, being divided into the Norphlet district (heavy-oil district) and the Louann district (light-oil district). There are presently four producing sands, namely: Nacatoch, Meakin, Graves, and Blossom, all of which are Upper Cretaceous in age.

Discovery well for the field was the Oil Operators Trust J. T. Murphy No. 1, Section 8, Township 16s, Range 15w. This well blew out on April 14, 1922, forming a crater approximately 450 ft. in diameter and 50 ft. deep. It was finally completed at a depth of ±2,024 ft. subsurface and had 950 psi. casing pressure or an estimated original bottom-hole pressure of 1,070 psi. The initial estimated production was 30,000,000 cu. ft. of gas per day. There were several other blowouts during the early life of the field which also dissipated reservoir energy.

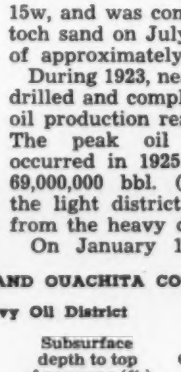
The V. K. F. Oil Co.'s 1 Richardson No. 1 was the first oil-producing well in the field. This well is located in Section 29, Township 15s, Range 15w, and was completed in the Nacatoch sand on July 1, 1922, at a depth of approximately 2,000 ft.

During 1923, nearly 1,000 wells were drilled and completed and the annual oil production reached 25,000,000 bbl. The peak oil production which occurred in 1925 was approximately 69,000,000 bbl. (9,500,000 bbl. from the light district and 59,500,000 bbl. from the heavy district).

On January 1, 1930, there were 2,998 producing wells (962 in the light district and 2,036 in the heavy district) with an average oil production of 20½ bbl. per well per day. In June 1946 there were only 1,528 producing wells (429 in the light district and 1,099 in the heavy district). Table 1 lists some of the pertinent data for Smackover field.

The majority of the Gulf Refining Co. wells in this field were drilled from 1922 through 1925 and at one time there were 443 Gulf-operated wells. As of December 1, 1948, there were only 76 Gulf-operated wells in the heavy district with an accumulative oil production of 42,055,387 bbl. and only 32 Gulf-operated wells in the light district with an accumulative oil production of 7,769,558 bbl.

Most of the 443 Gulf wells were originally completed as flowing wells, however, their flowing life averaged only 4 months and at this time they were put on the beam (standard rigs). Gulf's cumulative oil production from this field as of December 1948 was 49,824,945 bbl.



The author is zone petroleum engineer for Gulf Refining Co. at Shreveport. Best received B.S. degree in petroleum engineering from Texas A. & M. College in 1938. He was employed by Oliphant Oil Corp. as roustabout, then as petroleum engineer until entering the U. S. Army in 1942. After discharge from the service in 1945 he went with Gulf.

Need for Electrification Project

Since 1945 it had become increasingly apparent that the Smackover heavy properties would require more economical production methods if they were to operate at a profit. The most important factor contributing to inefficient operation was the large number of standard rigs, 20 or more years old, which were continually in need of repair or off production.

A report on the possibilities of equipping these properties with pumping units and electric motors was submitted by company engineers in 1946. The report demonstrated that it would be feasible to equip 72 to 79 wells with this modern equipment and so reduce operation costs that a pay out could be realized in slightly over 3 years.

TABLE 1—SMACKOVER FIELD, UNION AND OUACHITA COUNTIES, ARKANSAS

Smackover Heavy Oil District

Year discovered	Producing zone*	Subsurface depth to top of pay zone (ft.)	Gravity °A.P.I.	Surface area (acres)
1922	Nacatoch	2,000-2,100	21 avg.	16,180
1923	Ozan	2,250-2,350	Range (18-23)	.....
1925	Ozan	2,350-2,450		6,490
1925	Tokio	2,550-2,650		7,750
1926	Tokio	2,675-2,800		1,000

Smackover Light Oil District

1922	Nacatoch	2,050-2,100	27 avg.	2,030
1923	Meakin	2,250-2,300		9,510
1923	.....	2,600-2,700		550

	Field prod. (1-1-50) (bbl.)
Total Smackover heavy	344,857,858
Total Smackover light	55,796,385
Total field	400,654,243

*All are of Upper Cretaceous age.

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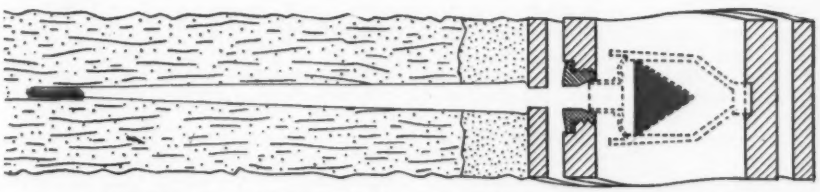
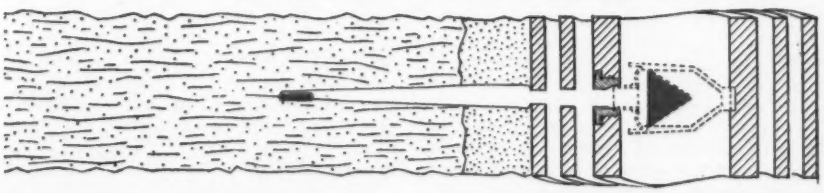
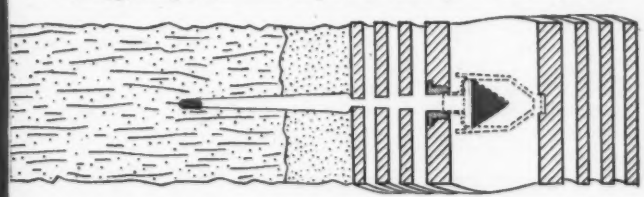


"Jet" in 5" carrier easily perforates 7" casing and goes far into formation.



Two-string completions are no problem for "Jets" in 4" carrier.



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Regardless of whether or not casing is symmetrical with hole, Du Pont Jet Perforators cut through with no difficulty . . . assure uniform perforations.

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The alternatives to electrification were:

1. Continued operation of the properties under present conditions with necessary repairs.

2. Installation of pumping units powered by multicylinder engines.

Investigation revealed that operation of the leases in their present condition would not be economical since repairs to equipment would be a continually increasing item. In addition, a number of major repairs involving revamping of rig fronts and other work would have been necessary, with an estimated cost in excess of $100,000. Even though the major repairs had been effected, lifting costs could not have been substantially reduced.

Powering of the planned pumping units with multicylinder gas engines would have raised the initial investment by $60,000 due to the greater cost of engines over electric motors. This, and other factors, together with the repair expense attending the operation of the engines, would narrow the advantage gained to a reduction only of rig repair.

Approval of the program for the electrification of 79 wells was secured in the latter part of 1947, and work was started immediately on selecting and lining up equipment, designing foundations, and making final arrangements with the power company for energy.

Before actual construction was begun, however, the power company was able definitely to make a commitment that would assure ample power.

Planning and Installation

A dynamometer survey was undertaken for the purpose of securing information necessary for the selection of pumping units and motors. Fifty-seven representative wells were weighed, and from dynamometer and production data individual units were sized for all 79 wells. Each well was considered for pay out individually, and unless a reasonable amortization of its investment could be shown, that well was eliminated from the program. A lower limit of 40,000-in.-lb. peak torque was placed on unit size so that after well abandonment in later years, the units could be salvaged and used elsewhere. In order to insure maximum interchangeability for electric motors, 5 hp. was set as the smallest to be installed.

As the loads imposed upon equipment in Smackover field are unusually severe and the resulting specifications for pumping units are high, the equipment of several manufacturers was carefully studied. Primary considerations for unit selection were design and price.

A unit embodying several desirable features in the 40,000-in.-lb. class was chosen and orders were placed for 41 of them. Twenty-eight units ranging from 58,000-in.-lb. to 324,000-in.-lb. peak torque rating were also ordered. Later two additional units of 40,000-in.-lb. rating were purchased, bringing the total to 71. All units are of the double-reduction type with twin cranks, roller bearings for high and intermediate-speed shafts, and bronze sleeve bearings for low-speed shafts.

Motor sizes range from 5 to 60 hp. All are 1,200 r.p.m., 440-volt, three phase, 60-cycle, squirrel-cage induction motors, type KG (high starting torque, low starting current, normal slip). Motors under 40 hp. have ball bearing on both ends; the others have roller bearings on the drive end and ball bearings on the opposite end.

The oil-field pumping controls selected have a circuit breaker and lightning arrestor, a magnetic line-starter and two bimetal thermal-overload relays. A time-delay relay is incorporated in order that motors will start automatically, yet not all at one time, after any power interruption is cleared. A meter socket is wired into the circuit to facilitate testing. This equipment is mounted in a steel weatherproof box suitable for outdoor mounting, with a "dead front" inner door to protect the operator from live parts when starting or stopping the motor.

During actual construction, three engineers were kept on the job working in conjunction with the field foreman. The engineers were responsible for the unit-site preparation, checking of forms, reinforcing installation, and bolt settings before pouring of concrete was allowed. All contract work, both construction and electrical, was inspected by an engineer before acceptance. Very close contact was maintained with all work, consequently, the grade of workmanship was considered above the average.

A total of 800 cu. yd. of concrete was poured in 69 unit-foundation forms, actual pouring was completed on November 15, 1948. Two additional foundations were constructed later. Unit setting had kept up with block construction and at this date 68 units had been set and 45 grouted in.

All secondary lines to wells had been completed by this date, but the power company had not been able to finish all of its primaries so only three wells were actually running on electric power. Motor connection and starter-box setting continued into December with wells being put on power as fast as connections were available. By December 30, 1948, 61 wells were pumping on electric power. The slow delivery of some equipment caused delay in the conversion and it was not until March 18, 1949, that the last well was changed over.

Very little down time was necessary when switching from standard rig to electric-unit power. The lease roustabout crew strung up, picked up the polished rod, installed a polished-rod clamp, laid the wooden walking beam down, hung the well on the unit rod hanger and commenced pumping with electric power. At this time the counterweights were adjusted by using a hookon volt-ammeter to ascertain when the load was balanced. Previously the proper length of stroke had been set and the strokes per minute determined by the pulley ratio.

The job of dismantling the standard rigs was solved by selling the rigs in place to the highest bidder, who took them down and cleared the location after all wells were on electric power. This represented a substantial saving in company labor, as practically no material was worth salvage except several gas engines which were needed in other places.

Pumping Units and Motors

The actual average-total input horsepower during the period April 1, through December 31, 1949, for 71 wells was 621.94 hp. while lifting 20,830 bbl. of fluid daily. During this same period, the average power cost per barrel of fluid was $0.0051 or an average of $0.0095 per kwh.

Surveys to determine unit and motor loading have been conducted in order to compare the original calculations with actual loading. These results are:

PUMPING UNITS

A.P.I peak torque rating (inch-pounds)	No. units	Per cent loaded based on peak torque rating
324,000	4	62.67
228,000	11	76.10
164,000	2	83.75
124,000	3	74.30
58,000	7	83.00
40,000	44	50.13

MOTORS

Horsepower rating	No. units	Average input horsepower
60	3	34.43
50	10	28.61
40	1	27.89
25	5	12.52
15	2	3.89
10	6	6.05
7.5	18	2.76
5	26	1.85

It should be noted that the average power to the 5, 7.5, and 15-hp. motors is very low and that smaller motors could have been used, however, it is anticipated that the fluid produced in the two wells equipped with 15-hp. motors will increase to the point where this power is required. For the 7.5 and 5-hp. motors, smaller sizes could have been used in many cases, however, the next smaller size (3 hp.) might have been undersized had the original calculated polished-rod horsepower been in error by 1 hp., which represents 33⅓ per cent in this case. In addition, there is sometimes a variation in power requirements for a short period of time after a well has been serviced and in many instances it is not unusual for this to be on the order of 1 hp. or more. With this in mind the larger-size

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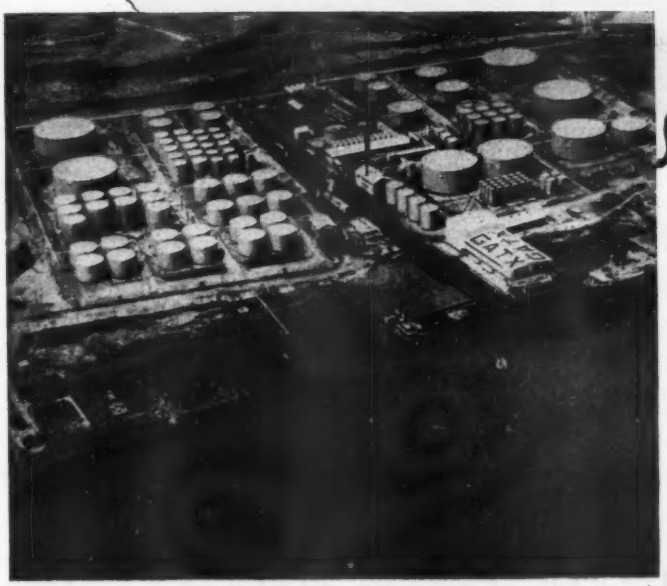

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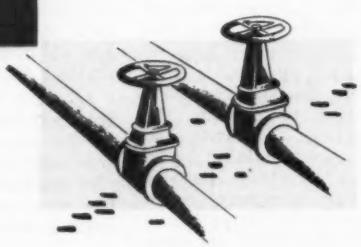

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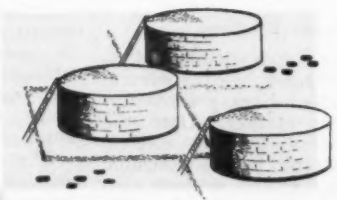

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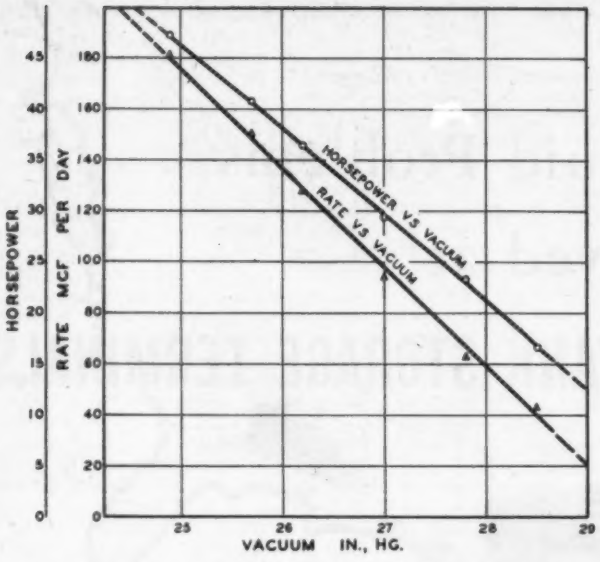


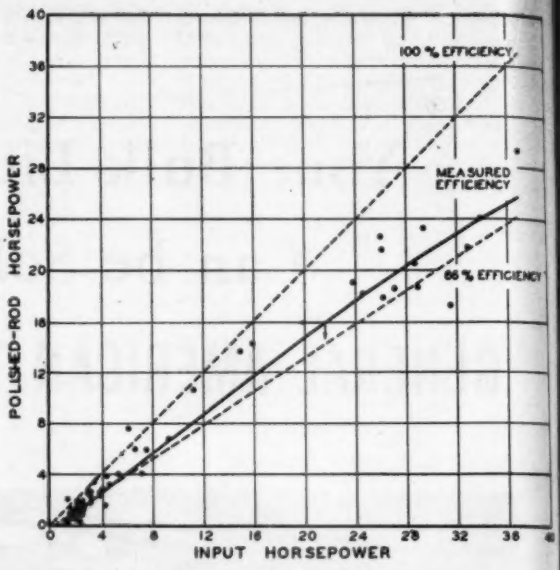


Fig. 1—(Left) Vacuum station test, Murphy & Hardy lease, Smackover, Arkansas. Twin double-acting 18 by 12-in. compressor, speed 184 r.p.m., discharging to atmosphere. Fig. 2—(Right) Smackover Heavy field, 1949: Measured polished-rod horsepower versus measured input horsepower, showing measured efficiency and calculated 100 and 66 per cent efficiencies (points are for measured curve).

motors were selected to assure continuous operations.

Capacitors

The electric-power company's rate for oil-well pumping is based on a demand charge and an energy charge, both charges being graduated downward as the amount of power used increases. There is a penalty clause for operating at less than 85 per cent power factor.

From tests conducted in the field, it was determined that the operating power factor was somewhat lower than the 85 per cent stipulated in the contract. The power company requested this condition be corrected as it created an unnecessary load on their already loaded system.

Capacitors were installed at each well-motor location to provide the necessary correction. An indicated pay of 8 months was calculated based entirely on the monthly penalty which the power company could assess. In addition to the above stated economic value, capacitors increase the voltage level and reduce the line losses.

Vacuum Stations

Wellhead vacuum is maintained on the Nacatoch sand wells, several wells being pulled from a centrally-located vacuum station. After the wells were converted to electric power for pumping, it was desirable to electrify the vacuum stations also in order that maximum benefits might be derived from electrification.

Calculations were made to determine the motor size required. The first station put into operation had a twin 18 by 12 in., double acting pump, driven at 184 r.p.m. by a 25-hp. motor. The average input to the motor is about 9 hp. to maintain 29 in. of mercury vacuum and discharge to a gathering system at 15 in. of mercury vacuum. About 17 M.c.f. of gas is handled per day. Tests were run at this station to determine the horsepower requirements for handling various volumes of gas, the results of test runs are shown on Fig. 1.

Following the first station, five additional ones were electrified using motors ranging in size from 20 hp. to 40 hp. It is necessary to use a motor considerably larger than the requirements for average operating conditions, in order that the station will start and operate following any shutdown which will cause the vacuum to drop and thus increase the gas volume, in turn, overloading and stalling a small motor.

In all cases, V-belts were used to transmit the power from the motor to the pump and a grooved sheave was used at the motor. By using the flat pulleys which were already on the vacuum pumps, the costs were kept to a minimum.

Sizing Motors for Increasing Loads

Tests were run to determine the practicability of using a large motor to pump a well which could be pumped with a small motor at present but would ultimately require a large one in cases of increasing fluid production.

The well selected was equipped with a 228,000-in.-lb. unit and a 25-hp. motor. This equipment is larger than currently required but an increase in total fluid is anticipated.

Tests were run with the 25-hp. motor and it was found to have an input of 14.52 hp. A 60-hp. motor was then installed and tests showed it to have a 15.18-hp. input. It was determined that it would cost $4.90 per month more to operate the large motor. With the 25-hp. motor, the power factor was 63 per cent and with the 60-hp. motor the power factor was 39 per cent.

From the case above it can be seen that it is more economical to use a motor approaching the proper size. In addition to the monthly saving in power costs, there is a smaller initial investment in equipment and less capacitor-correction is required to improve the power factor.

In places where an increasing amount of fluid is to be expected, it might be found that triple-rated motors are more desirable than single rated. The motor would be connected for the smaller rating during the early operations, and as the amount of fluid produced increased, it would only be necessary to reconnect the motor for the intermediate rating and ultimately reconnect it for the higher rating in the final stages of production.

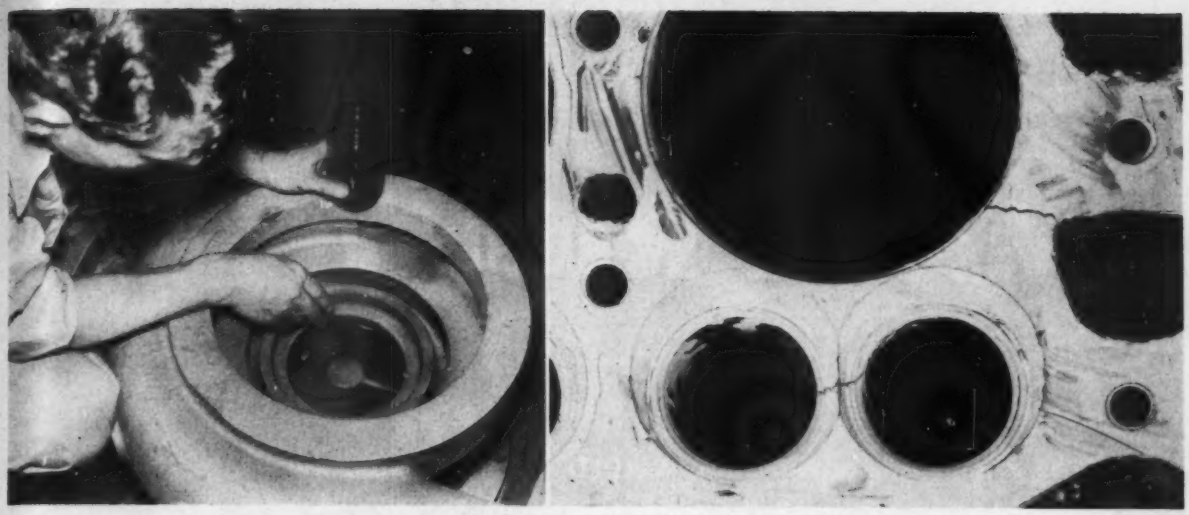
Relation Between Polished-Rod Horsepower and Input Horsepower

The polished-rod horsepower was determined for all 71 wells by means of a dynamometer survey. Input horsepower to all motors was measured with a conventional watthour meter. These data are presented graphically for the purpose of showing the relation between polished-rod

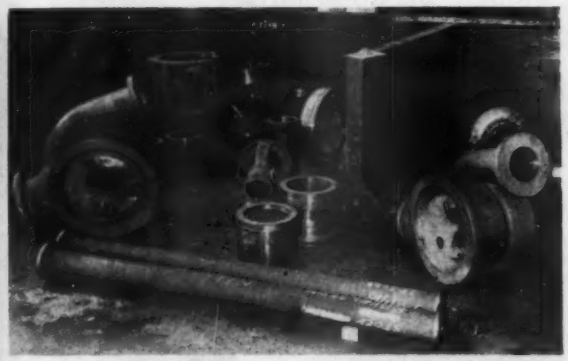
(Continued on page 92)

Motor size	Demand	Energy per day	Power factor	Input	Power cost per month
25 hp.	11 kw.	260 kw.-hr.	.63	14.52 hp.	$79.47
60 hp.	12 kw.	272 kw.-hr.	.39	15.18 hp.	84.37

Pumping depth, 2,168 ft. Fluid production, 122 bbl. per day.



Time and material are saved by using this method for inspecting machinery castings. Left: By checking the rough casting for defects prior to machining operations, rejection of finished parts may be essentially eliminated. The method provides an answer to one of the problems of maintenance. Before reworking, a machine component may be checked for cracks and other detrimental flaws. The cracks in the engine block, right, illustrate the advantage of inspection in maintenance operations.



Equipment parts of varying size and alloys, such as shown here, may be quickly checked for defects.

Nondestructive Inspection

Locates minute surface cracks, flaws in metals

by D. H. Stormont
California District Editor

SURFACE cracks and flaws, even those too small to be seen with a magnifying glass, now can be located quickly and economically in any metal by a new dye-penetrant method of inspection. First uses in the oil industry have been more or less confined to plants and shops, for inspecting castings, forging, machined surfaces, and so forth. Because of its simplicity and ease of application, however, the new process undoubtedly will find extensive oil-field use.

Briefly stated the inspection method consists of applying a red dye to the cleaned surface of the suspected part, removing the excess dye with a special cleaner, and then applying a "developer" solution. Almost immediately the presence of any crack or surface discontinuity is indicated by the red penetrant bleeding into the white coating formed by the developer.

Nature and extent of a flaw is indicated by the form in which the dye appears in the white coating. A thin line indicates a crack or "cold shut"; a group of dots in no particular pattern shows pits or porosity; and a series of dots in a line indicates a very tight crack, cold shut, or partially welded lap. With experience, the extent or probable depth of the opening can be estimated from the amount of dye that emerges from the flaw.

Properties of compounds used.—The three compounds employed in the inspection process can be applied by brushing, spraying, or dipping. All are noncorrosive so that after a part has been tested and found free of flaws it can be placed or continued in service. Thus in checking the quality of welds for example, whenever a flaw is found the white developer residue can be brushed off and the weld repaired.

The penetrant used is a supersaturated liquid with a nonwater-soluble red dye. It has an extremely low surface tension and high capillarity, enabling it to flow into the most minute crevices. The cleaner used to prepare the metal surface for receiving the penetrant, and for removing excess dye, is a quick-acting solvent. The developer is a quick-drying compound consisting of an inert powder suspended in liquid. In drying, it tends to draw the dye from any concealed crack by mechanical action.

Application of process.—The part to be inspected should be physically clean—free from dirt, loose scale, oil and grease—but the surface need not be smooth. For maximum sensitivity to very small flaws the metal's temperature should be somewhere between 100° and 150° F. Steel brushes may be used to remove foreign deposits but a sand blast should not be used because of the danger of peening over any small crevice.

Details of just how the process is applied cannot be taken up in this article. The technique is quite simple, however, and consists of the following three steps after cleaning: (1) The part is covered with dye for about 5 minutes, the coating being applied by dipping, brushing, or spraying. (2) All visible penetrant is removed

(Continued on page 77)

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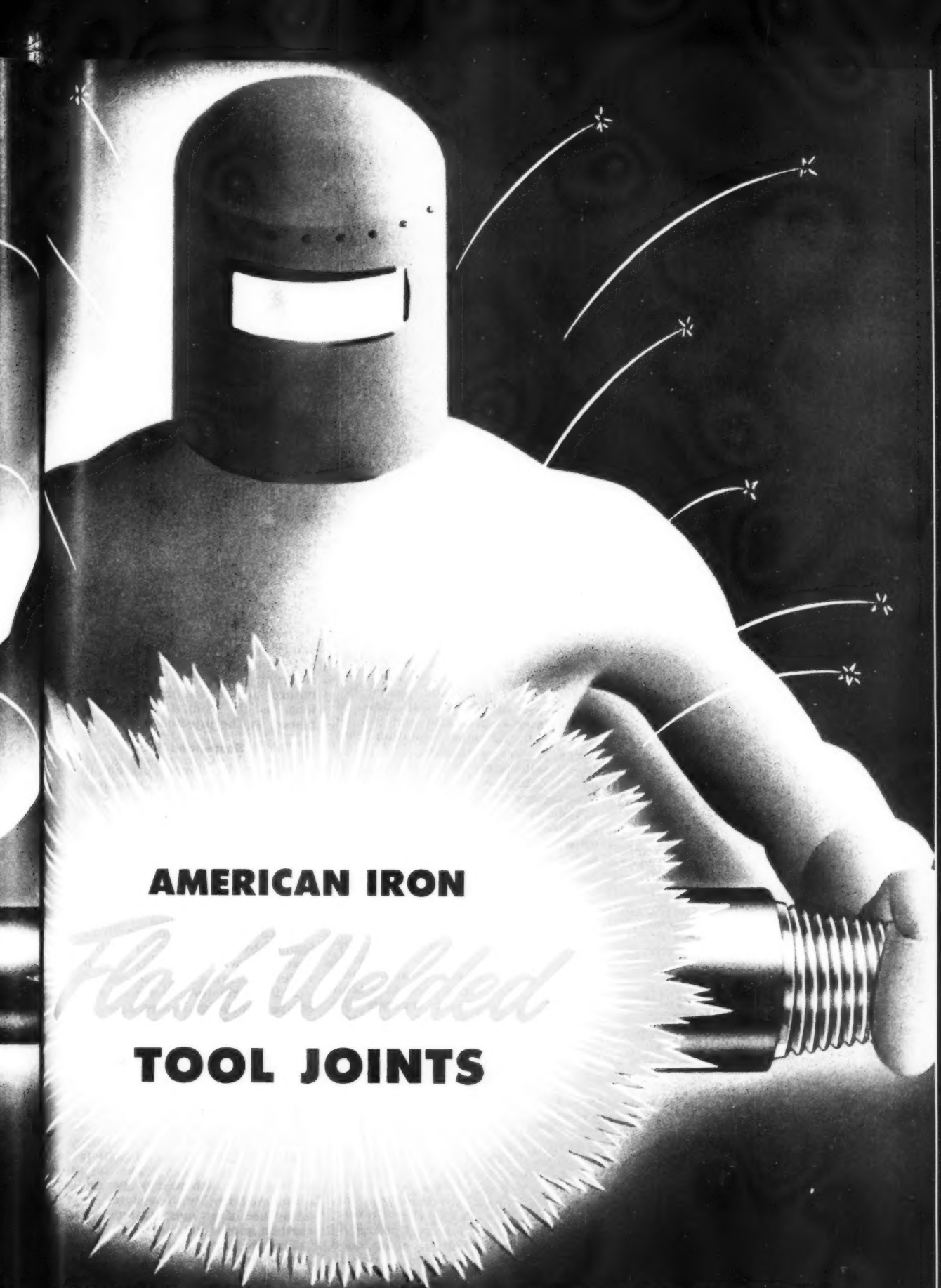

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Requirements of Subsurface Injection Water in Oil Production

by Kurt H. Andresen* and F. T. Gardner†

AFTER the operator has established that a given quantity of water is to be injected for maximum oil recovery from a given pool, the question arises as to where to secure most economically the water which is to meet his injection requirements. Various sources are available.

The supply may be fresh surface or ground water, or it may be saline, either from open seas or oceans or from subsurface salt water formations. An assured supply of fresh water is frequently not available at the location where water injection is practiced. Fresh water, however, is being used to a considerable extent in the Appalachian region, and there are some localities in the Missouri-Mississippi drainage system where surplus fresh water is available.

Ground water‡ is generally available in regions where surface freshwater supplies are adequate to meet municipal, industrial, and agricultural needs. However, in a number of areas in the United States groundwater withdrawal is being practiced at such a rate that saline encroachment of the ground-water table is occasioning alarm. In such regions withdrawal of additional ground water for oil field use may not be permitted.

Use of salt water from open or land-locked seas is, in principle, applicable wherever the oil-field site is sufficiently near to the sea so that transportation costs do not render the operation too costly. This water source has seldom been used to date due to geographical considerations. There are a number of producing areas where the ocean seems a ready answer to water requirements.

A common raw-water supply is the water produced concurrently with the oil. Although in an idealized case for each barrel of water injected a barrel of hydrocarbons is withdrawn, in reality a continually increasing portion of water is produced during the life of any water-injection project. Therefore, the amount of water required from an outside source becomes less and less with time as more water is produced and can be returned to the same formation from which it was withdrawn. In many fields salt-water disposal can thus be combined with water drive or flooding operations.

The mere return to the producing formation of the water produced with oil will not meet the requirements of the reservoir engineer. If makeup water from the same formation is to be employed, the source of makeup must not be in hydraulic communication with a reservoir, i.e., some impermeable barrier such as a fault must separate the oil-producing reservoir and the water source. Utilization of subsurface water from other horizons not locally producing hydrocarbons is frequently a possibility. For example, in northeastern Oklahoma and in eastern Kansas, the Arbuckle limestone, a prolific acquifer, is not oil producing and is being used as a source of water for flooding the Bartlesville sand.

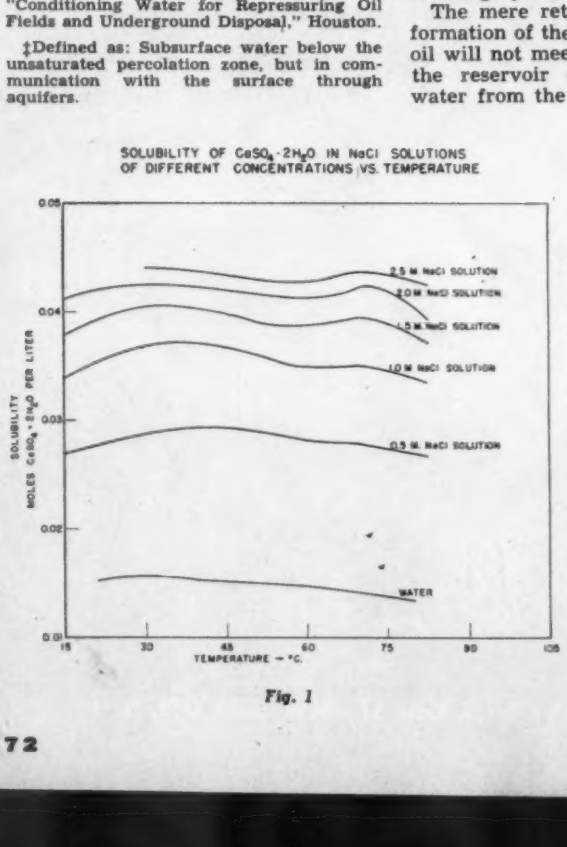

Fig. 1

*Research engineer, Carter Oil Co., Tulsa. †Professor of chemistry, University of Tulsa. Summary report of paper given at American Chemical Society symposium on "Conditioning Water for Repressuring Oil Fields and Underground Disposal," Houston.

‡Defined as: Subsurface water below the unsaturated percolation zone, but in communication with the surface through aquifers.

Control of Injection Water Properties

Regardless of the choice of the raw-water supply, the properties of the water must be such as to have little or no detrimental effect on the injection rates; it must not lead to plugging or to mechanical failure of the injection system. Among the effects which may be caused by poorly selected or improperly conditioned water are:

1. Plugging of input system by suspended matter carried in the water or by products of corrosion.
2. Mechanical failure of input system due to corrosion by water.
3. Plugging of input system by salts precipitated from solution due to supersaturation of water or due to interaction between the water and the connate water of reservoir.
4. Plugging of system by growths of bacteria or algae.
5. Swelling of clay minerals of reservoir rock due to changes in nature and concentration of solute ions, as the connate water is displaced by the injected water.

Suspended Solids

Suspended sediment present in the water may be due to one or more of the following causes:

1. Silt or contamination existent in the water at the source.
2. Silt suspended in the water during movement through earthen gathering pits.
3. Corrosion products formed through contact with gathering or producing equipment.
4. Insoluble reaction products formed by the interaction of treating chemicals with solutes present in the water.
5. Products formed by aeration or escape of dissolved gases.
6. Growths of bacteria and algae dislodged from walls of equipment and carried along in the system.

The nature of the gathering system employed will have a bearing on the magnitude of some of these effects. An open system employing earthen pits for intermediate water storage, unless very carefully operated, may be a frequent contributor of unwanted silt to the injection system. This effect may be entirely eliminated by use of a closed system or by use of an open system without earthen pits.

The presence of corrosion products in the water originating from contact with gathering lines and equipment may be minimized, although

not fully eliminated, through employment of effective corrosion control in the oil-producing and water-gathering system. Techniques in general practice today make possible a great reduction in the volume of corrosion products handled.

The formation of insoluble products due to liberation of gases or aeration may very seriously contribute to the presence of suspended materials in injection waters. Among the reactions frequently observed are:

$$2HCO_3^- \rightarrow CO_2\uparrow + H_2O + CO_3^{2-} \quad (1)$$

$$CO_3^{2-} + \begin{Bmatrix} Fe^{2+} \\ Ca^{2+} \end{Bmatrix} \rightarrow \begin{Bmatrix} FeCO_3 \\ CaCO_3 \end{Bmatrix}$$

$$4Fe^{2+} + O_2 + 4H_2O \rightarrow Fe_2O_3 + 8H^+ \quad (2)$$

$$2H_2S + O_2 \rightarrow 2H_2O + 2S \quad (3)$$

The suspended solids resulting from these reactions are iron or calcium carbonate, iron oxide, and free sulfur.

Measures for the removal of suspended matter are usually required which may involve open or closed settling basins used with or without an added flocculating agent. Employment of a sand-bed filter, following the settling process, is always desirable and usually a necessity if adequate sediment removal is to be obtained. Maintenance of a closed system downstream from the filter is good practice if the formation of further sediment caused by aeration or escape of dissolved gases is to be prevented.

The presence of traces of oil in water in the form of finely divided droplets has been considered by some workers to be a potential cause of decreased injection rates. Several field systems have been observed in which water bearing traces of suspended oil was being taken by formations of low permeability without appreciable effect on the rate. It appears that small quantities of oil emulsified or suspended in the injection water will generally not cause any damage to the intake capacity of a well.

Corrosion

The occurrence of appreciable corrosion may become a very serious matter resulting in the failure of mechanical equipment or the plugging of the reservoir formation by corrosion products. Among the possible means for reducing corrosion are:

1. Exclusion of air from the gathering and injection system.
2. Elevation of the pH of the water.
3. Employment of corrosion-resistant materials.
4. Application of corrosion-resistant coatings.
5. Addition of corrosion inhibitors.

The exclusion of air from the gathering and injection system will usually have a marked effect in reducing the corrosion rate. This is especially true of systems devoid of hydrogen sulfide or similar strong reducing agents. Dissolved oxygen is usually, if not always, absent in ground waters. Apparently aerobic bacteria create a reducing environment with resultant removal of traces of oxygen. Often, very simple modifications of the water-supply system will provide a water which is free of dissolved oxygen.

In several water-flood operations where the raw water supply is saturated with oxygen, the installation of vacuum deaerating equipment has satisfactorily reduced the oxygen concentration and decreased corrosion rate of the surface equipment. Chemical oxygen removal by the addition of reducing agents such as sulfites or nitrites, has been suggested. The development of effective corrosion-inhibiting additives apparently has limited the use of deoxidizing methods as a water-conditioning method.

Elevation of the pH of the water is in principle a method of retarding corrosion commonly advocated in boiler or municipal water treatment. It is frequently not advisable for conditioning water in injection systems. If the water supply contains a significant concentration of buffer ions the cost of chemicals for the desired pH elevation may be prohibitive. Precipitate formation, particularly in reservoir interstices, will frequently result if the pH of the water is raised appreciably. This possibility should always be carefully explored before employment of a base as a means of corrosion control.

Consideration has been given to corrosion-resistant alloys for construction of collection and injection systems, particularly for subsurface equipment. Numerous alloys such as monel, aluminum, and nickel steels show increased corrosion resistance as compared to plain steels for water-handling service. In general these alloys must show a greatly lengthened service life to justify their increased cost. There is room for a great deal of work in this field, aimed at the production of alloys showing satisfactory corrosion resistance in a price range competitive with plain steels.

Considerable field experimentation with coated steel pipe is now under way. Among the coatings which have been tried are baked phenol-formaldehyde resins and sprayed vinyl resins. In any injection system handling brine which is produced together with crude oil, a trace of oil will usually remain in the water, which may result in softening or even removal of the coating. Both sprayed vinyl and baked phenol-formaldehyde coatings show excellent resistance to oil. The cost of these coatings for tubular goods in not inordinately high. The chief difficulty encountered to date is in establishment of a substantially continuous film over all of the surface of the metal to be coated, especially at couplings, so that the user may be assured of protection over a sufficiently extended service life to justify application of the coating.

Pipe internally coated with portland cement has been successfully used in a number of fields. Disadvantages of cement coatings are the appreciable reduction in cross section available for fluid handling and the increased weight due to the layer of portland cement.

There is considerable current activity in the field of nonmetallic substitutes. Cement-asbestos pipe is now employed on a large scale for low-pressure surface installations. Where rubber sealing rings are used with cement-asbestos pipe, employment of an oil-resistant rubber is good practice. The current experimental trial of pipe of plastic-bonded glass fiber in salt-water-disposal service is being followed with much interest in the oil industry. This may quite conceivably be the beginning of an era of extremely active competition between producers of metallic and nonmetallic piping.

The addition of a corrosion inhibitor is a feasible means for corrosion retardation in subsurface water-injection practice. The most serious objection to employment of inhibitors is the need for addition either continuously or at very frequent time intervals; field personnel prefer a corrosion-prevention practice which does not require close supervision and maintenance. However, the low cost

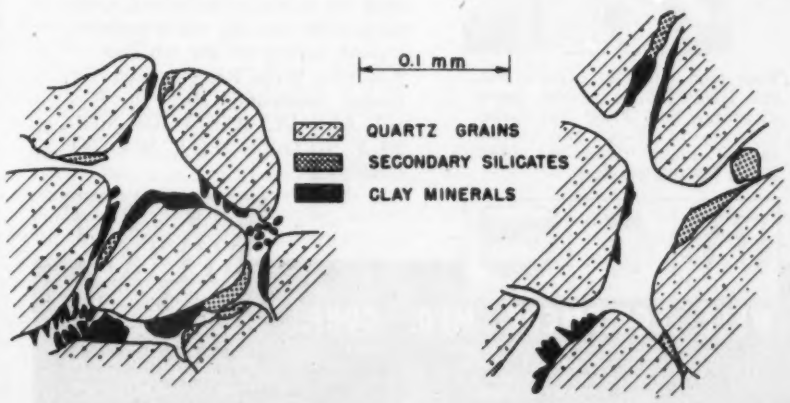

Fig. 2—Schematic picture of pores in oil reservoir sandstone.

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FIG. 602

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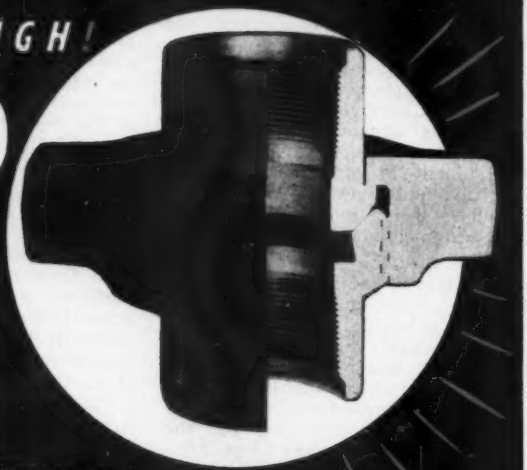

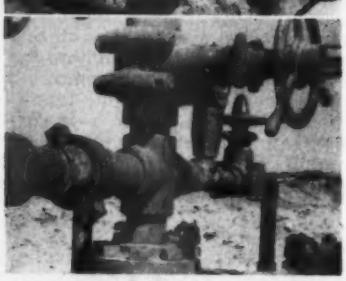

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of inhibitor treatment, including material and labor charges, has shown in many instances that this method of corrosion control is very economical. Inhibitors in common use fall into three groups:

1. Salts furnishing strongly oxidizing anions.
2. Salts furnishing cations having large ionic volumes.
3. Solutes which form and maintain a continuous protective film over substantially all of the metal surface to be protected.

Chromates and nitrites are examples of the first type which are in commercial use. These materials exert a marked passivating effect over anodic areas of corroding metal. However, the presence of any reducing agent may effect partial or complete reduction of the oxidizing anion with loss of the desired protection. For example, chromates and nitrites are ineffective in systems containing hydrogen sulfide in stoichiometric excess of the added ion. Also, inhibitors of this type are most effective at a pH higher than that frequently encountered in waters being handled.

Salts furnishing substituted ammonium ions of large ionic volume are available in a variety of commercial inhibitors. These materials include coal-tar bases, amines derived from abiatic acid, and quaternary amines prepared from fatty acids. The action of this type of inhibitor is probably due to strong adsorption of the discharged substituted ammonium ion on cathodic areas of local corrosion on the metal surface. These inhibitors are effective at low concentrations. They may be used successfully in strongly reducing waters having a low pH.

Formaldehyde is an example of an inhibitor in hydrogen sulfide-bearing water which is believed to function through the formation of a protective film over the entire surface.

Precipitate Formation

The formation of a precipitate during the passage of the water through the injection system or the reservoir interstices may occur unless careful control is maintained. Adequate knowledge of the potential changes of the water to be anticipated over a period of time, or with changes of temperature and pressure, or when mixed with the connate water of the reservoir is essential. Among the precipitated materials which may be encountered are the following: calcium, strontium, or barium sulfates; calcium carbonate; magnesium hydroxide; hydrates of iron or manganese oxide; iron sulfide.

The employment of water analyses in conjunction with solubility products for slightly soluble salts in pure water may lead to errors in predicting solubility relationships when waters of different origin are mixed. The presence of high concentrations

of solute ions, most often CA^{2+}, Na^{+}, and Cl^{-} is frequently encountered with resultant high ionic strength of the solution. While the Debye-Hückel equation gives a quantitative relationship between the activity coefficient of a given ion and the ionic strength of a dilute solution, this equation does not apply rigorously for solutions of high ionic strength. However, the implications of the equation, i.e., that the activity coefficient of any solute ion will decrease as the ionic strength of the solution is increased are generally realized. For any slightly soluble electrolyte:

$$AaBs(s) \rightleftharpoons aA^{m+} + bB^{n-}$$

and the solubility product of the solute is:

$$Ksp = (\text{Activity } A^{m+})^{a} \times (\text{Activity } B^{n-})^{b}$$

For a given ion the activity is equal to fc, where f is the activity coefficient of the ion and c is the ion concentration. If f decreases as the ionic strength increases in accordance with the Debye-Hückel equation the concentration c for each of the solute ions must increase correspondingly before the ion product exceeds the solubility product with resultant precipitation. This effect is shown in Fig. 1 where the solubility of $CaSO_4 \cdot 2H_2O$ in distilled water and in NaCl-solutions of different concentrations is plotted versus temperature[1]. Similar curves have been obtained for other slightly soluble salts.

The solubility of $CaCO_3$, $Mg(OH)_2$, and $Fe_2O_3 \cdot xH_2O$ decreases with increasing pH, for a solution of given ionic strength and HCO_3^- concentration. Addition of a base for elevation of the pH should be practiced only if it is definitely established that precipitation will not occur in the reservoir pores as a result of this treatment. The precipitation of hydrated iron or manganese oxide will usually be observed only with waters which have previously been subjected to aeration.

If an injected water is supersaturated with respect to one or more solute salts, or if any slightly soluble materials are present in colloidal suspension, the formation of solid depositions in the injection system is an ever-present danger. The movement of a large amount of water showing a very slight supersaturation or carrying traces of substance in colloidal suspension may create a very serious problem if it continuously deposits small amounts of solids in the rock interstices at the well over extended periods of time. Ideally the water should be undersaturated both in the injection system and after mixing with water present in the reservoir. This consideration should be borne in mind if a choice is offered between water supplies. A filter of the sand-bed type should be so designed as to allow adequate contact time and to offer sufficient surface area for adsorption and crystal deposition. The emergent water from the filter should be substantially free of colloidal material and should not be supersaturated.

Organic Growths

Growths of algae, or of aerobic or anaerobic bacteria are potential causes of rapid plugging in any operation, especially where the temperature of the water is favorable to intensive proliferation. The propagation of algae seems to be limited to conditions requiring the presence of both air and sunlight. While the available food supply for many species of microorganisms may greatly curtail the extent of proliferation, the separation of a very small concentration of the growth may soon lead to serious drops in injection rates if the microorganisms become segregated and lodged in the reservoir interstices adjacent to the well bore.

Several anaerobic bacterial species are known to thrive on sulfur- containing ions including SO_4^{2-}. Rapid growth of such anaerobes in colonies with resultant plugging action has frequently been observed.

A properly operated filter will remove the organisms accumulated in growths or colonies in the water. However, the slimy consistency of many of these organisms will cause a marked reduction in filter capacity. Further extensive proliferation, particularly of anaerobic species, may occur downstream from the filter.

Wherever possible a sterilizing agent should be added to the water in advance of appreciable growth of microorganisms. Even in cases where trouble with algae or bacteria has not been encountered, sterilization of the water is an inexpensive safeguard against what may quickly become a serious problem in event of future contamination by any of the many species of microorganisms.

Many sterilizing agents have been found to be effective in low concentrations. A material in wide use in oil-field practice is chlorine introduced either in its elementary form or as hypochlorite. Waters which have been aerated and which therefore contain very little residual reducing material, such as hydrogen sulfide, require less chlorine to maintain effective sterilization than unaerated waters. Sodium pentachlorphenolate, formaldehyde, quaternary amines, and phenols are among the types of sterilizing agents which are effective in low concentrations in reducing systems.

Although there is no doubt that organic growths of any kind generally must be considered as potentially dangerous in water-injection systems, in certain cases the presence of the right kind of bacteria may be beneficial. One of these cases may be found in the proposed use of bacteria as an aid in removing oil from reservoirs. By injecting properly conditioned strains of anaerobic bacteria, the organisms may either generate surface-active material or propagate in the pores of the reservoir rock in such a manner as to enable the release of the oil which otherwise cannot be removed by the water[2]. While this idea has not progressed beyond the phase of exploratory study, one case of useful action of organic growth in water injection practice has been observed.

Sea water has been used for a period of several years in a system employing unprotected steel equipment. No traces of metal corrosion have been detected, although the sea water, saturated with dissolved oxygen, would be expected to exhibit a highly corrosive action on steel pipe, especially since the water was free of any kind of corrosion-inhibiting additives. So-called fouling organisms, an aerobic growth of such material as mollusks, Bryozoa, sponges, and tunicates, develop in thin layers on metal surfaces, thus forming a natural protective coating against corrosive attack[3]. Treatment to destroy these organisms will lead to severe corrosion in a short time. In all probability these useful growths will eventually interfere with the efficient behavior of the input wells, although up to this time no detrimental effects have been observed.

Effects on Reservoir Rock

Studies of numerous research institutions on the displacement of oil by water have shown that the oil-bearing rock is a highly complex system of capillaries, whose equivalent diameters are of the order of 1 to 100 μ. Sandstone reservoirs are made up of quartz grains which are generally consolidated by secondary silicates and clay minerals. Clay minerals in oil sands belong to one or several of the following groups: mica, illite, chlorite, montmorillonite, and kaolinite. Even though the total percentage of clay minerals in most sandstones is small, they frequently cover a large proportion of the quartz surfaces and, therefore, are of importance in the mechanisms of oil removal from the reservoir rock. As an illustration, a schematic picture is given in Fig. 2, which was drawn from observation of a thin section of an oil-bearing sandstone. The blank spaces in the pictures are pore openings, in which the oil and connate water are located.

Most clay minerals possess base-exchange and hydration properties which are of special interest to the petroleum engineer who applies water-injection techniques. X-ray studies have disclosed that clay minerals form an atomic lattice in which aluminum hydroxide groups and silica-oxygen groups are the most important building units[4]. The arrangement of these groups within the

XUM

lattice is dependent to a large degree on the presence of cations, as for instance, sodium, magnesium, calcium, or hydrogen. These ions are incorporated in the structure of the lattice, but they are held in place relatively loosely and can be removed and displaced by others. For instance, if a solution of sodium chloride is brought in contact with a calcium-containing clay, an exchange may take place between the two cations and the sodium might replace the calcium in the clay micelle. With this exchange of ions a change in properties frequently takes place, especially with regard to the water which is a part of the clay structure[5]. Through the incorporation of water in the system, the lattice may expand and this hydration process can result in considerable swelling of the clay minerals. Some clay minerals are highly susceptible to swelling if conditions are favorable to the adsorption of water. For instance, members of montmorillonite group are very susceptible to hydration, whereas kaolinite-type clays do not hydrate appreciably.

This hydration or swelling phenomenon can have a very pronounced effect on the pore diameters of the sandstone reservoir through which the fluids travel. Certain sandstones become entirely impermeable when brought in contact with waters which cause strong swelling of the clay minerals. Water of either a low ionic strength or of low hydrogen-ion concentration is especially effective with regard to permeability reduction.

The effect of the input waters on the clay minerals present in sandstone reservoirs must be investigated prior to initiation of a water injection project. If such study indicates that the available water may cause swelling of the clay minerals present, an increase of the ionic strength by adding calcium salts, or a lowering of the pH so as to increase the hydrogen-ion concentration may prove to be the best treating procedure.

For years the idea of adding surface-active materials to the injection water has been considered by waterflood operators[6]. Oil-bearing rock is a capillary system in which the effect of the wettability of the fluids on the solid surfaces plays an important role during the oil-displacement process. Laboratory studies have shown that the addition of surface-active agents to flood waters can substantially reduce the residual-oil saturation and that the conductivity of the rock for water can be increased. As far as is known, no large-scale use has been made of surface-active agents to increase oil recoveries or to improve the injection behavior of wells.

Operating Problems

The operator endeavoring to apply good practice to a water-injection project is usually confronted by a variety of problems and conflicting requirements. Among the operational complications encountered are:

1. Collection of water from a group of oil-producing properties where collection and storage procedures vary.
2. Change in properties of water supply, either permanent or seasonal.
3. Change of water source.
4. Sharing of water supply with household or industrial users.

Regular and systematic analysis of the raw-water supply is essential where any possibility of changes in quality of water supply is believed to occur. Treatment should, of course, be modified in accordance with the analytical findings. Even where substantial constancy of water composition supposedly exists, periodic analyses are an inexpensive safeguard.

The choice of any system of treatment of water prior to injection is necessarily a series of compromises between desirable and undesirable effects resulting from the treatment. In view of the considerations, it is evident that establishment of a high pH in injected water is attended by a series of resultant advantages and disadvantages. Among these are:

Advantages of High pH

Minimum concentration of Fe^{2+}, Mn^{4+}, and Ca^{2+} remaining in solution.

Decreased corrosion rate.

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Increased effectiveness of flocculating agent.

Disadvantages of High pH

Increased possibility of precipitation of $CaCO_3$, $Mg(OH)_2$, $Fe_2O_3 \times H_2O$, etc., in injection system.

Swelling effect on clay minerals of sandstone formations.

Cost of chemicals.

It is not possible to propose a blanket rule for weighing these advantages and disadvantages for the most desirable treatment. It may be safely said, however, that if interstitial precipitation or marked swelling of clay minerals will result from pH elevation, a low pH with its attendant undesirable effects must be elected. For cases where no plugging of the pores of the formation may result, the chemical cost to achieve the desired pH increase may be prohibitive, especially in systems handling brines which often show a very pronounced buffer control; but even fresh waters vary greatly in base requirements resulting in wide variations in treating costs.

The decision to operate in an open system with partial or complete aeration or in a closed system is likewise one which must be arrived at by compromise. Some of the advantages and disadvantages of aeration are:

Advantages of Aeration

Oxidation of Fe^{2+} and Mn^{2+} to Fe^{3+} and Mn^{4+} with resultant precipitation and removal of oxides.

Partial or complete removal of H_2S.

pH elevation due to CO_2 (and H_2S) loss.

Reduced chlorine demand for sterilization.

Disadvantages of Aeration

Increased volume of inorganic solids to be removed by filtration.

Possibility of formation of colloidal material (S, $Fe_2O_3.xH_2O$, etc.) not removed by filter.

Possible increased rate of proliferation of algae and aerobic bacteria.

Increase in corrosivity as a result of dissolved oxygen.

Increased equipment and operating costs.

There are many systems operating successfully employing substantially complete aeration. Some systems of this type are removing large amounts of H_2S from raw water through combined vaporization and oxidation in the aqueous phase. Carefully controlled systems employing complete aeration followed by adequate settling time and filtration deliver a water free of iron or manganese ions, sulfides, or elementary sulfur. On the other hand, many closed systems containing excess H_2S in which Fe^{2+} and Mn^{2+} are present and remain in the two-valent form and where oxidation of H_2S to free sulfur is not a problem are likewise operating successfully. No case is known to the authors where well-designed and operated water-injection systems of the two types and comparable capacities are using the same raw-water supply. It is, therefore, impossible to compare over-all costs directly. In general, it appears that the closed system offers better operating economy than the open system with aeration. Some operators are employing chlorine as a sterilizing agent in closed treating systems where the handled raw water is very low in reducing material. However, the possibility of precipitate formation should be carefully investigated. The addition of chlorine is likely to lead to plugging complications as a result of the oxidation of ferrous and manganous ions to hydrated ferric oxide or manganese dioxide.

One of the most serious mistakes which may be made in choosing a system for water treatment is to adopt indiscriminately a system which has been highly successful elsewhere. The system may not only be very expensive, due to difference in water supplies, but also may violate many of the precepts stated above, with resultant serious operating difficulties.

After selection of a satisfactory treatment system, it is essential that the mechanical design be given careful consideration. Chemical costs alone are not a safe index to treating costs. A treating system may show admirable chemical economy, but high over-all costs due to poor mechanical design. Conversely, a very well-designed system may show inordinarily high operating costs due to ineffective or nonexistent chemical control.

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Nondestructive Inspection

(Continued from page 69)

by swabbing or spraying with the cleaner solution. (3) The final step is to apply as light a coat as possible of developer, and after the coating is dry, to check for surface flaws.

As stated earlier, flaws are indicated by the developer drawing to the surface any dye which may be present in a crevice or discontinuity. The extent of the opening may be estimated by the width of the indication, or the amount of spreading of the red dye on the white developer. Scratches or other tool marks are not indicated because the metal is still solid.

The inspection process, known as "Dy-Chek" and developed by a subsidiary of Northrop Aircraft, Inc., originally was devised as a rapid means of checking gas-turbine engines without the necessity of complete disassembly. From this first usage the method grew into an inspection tool for checking parts of complex shape and varying cross-section, often difficult to inspect by sonic, X-ray, and other conventional processes.

Byron Jackson Co. at its nearby plant has found the penetrant method useful as a quick and economical means of checking castings at the receiving dock. By early detection of any surface defects, needless handling and machining of defective parts are eliminated.

Another use found for the inspection process is in locating fatigue cracks in engines and all types of machinery where preventive maintenance is desired. Although not yet thoroughly investigated, a potential use is for checking drill collars and pipe for fatigue cracks or incipient failures caused by hydrogen sulfide crystallization.

BOOKS

INDUSTRIAL INSTRUMENTATION. By Donald P. Eckman. Published by John Wiley & Sons, Inc., New York, 396 pp. $5.

As an "introduction to the science of measurement," this book is an expansion of the chapters describing measuring means and their characteristics and other portions of the author's earlier book "Principles of Industrial Process Control." The book covers principles and mechanisms involved in temperature measurement, including expansion thermometers, thermoelectric temperature measurement, resistance thermometers, and radiation-temperature measurement. The chapter on methods and instruments for composition analysis may be of particular interest to process and instrument engineers, as well as other readers, in view of current developments in spectroscopic and other analytical measurement methods applicable to petroleum processing. Pressure and vacuum measurements, including high-vacuum instrumentation are well covered. Other topics include measurement of level and head and flow metering. Instruments for mechanical measurement are discussed. The concluding chapter is concerned with process instrumentation with comment on selection and arrangement of instruments, transmission of readings, and the control system. Problems are provided at the end of each chapter to emphasize the points covered and to serve as classroom exercises.

WELDING PATENT CLASSIFICATION IN THE A. F. DAVIS WELDING LIBRARY. By Robert S. Green. Published by Ohio State University Engineering Experiment Station. 74 pp.

This publication gives the outline of the patent classification index and explains in detail the operation and use of the system. The Davis library maintains a collection of patents relating to the welding industry and the patent-classification system described in this bulletin is an effort to make this collection of greater value to students and industry.

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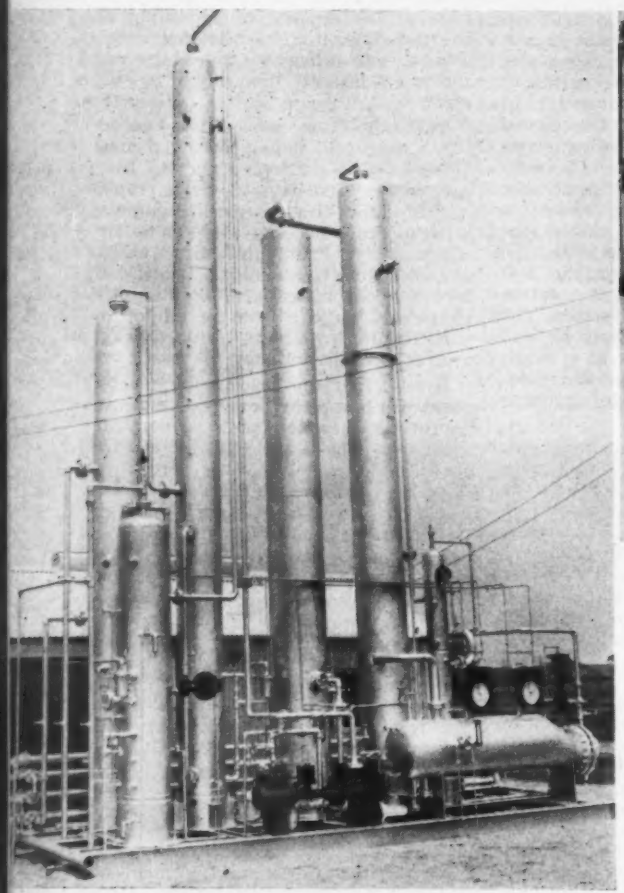

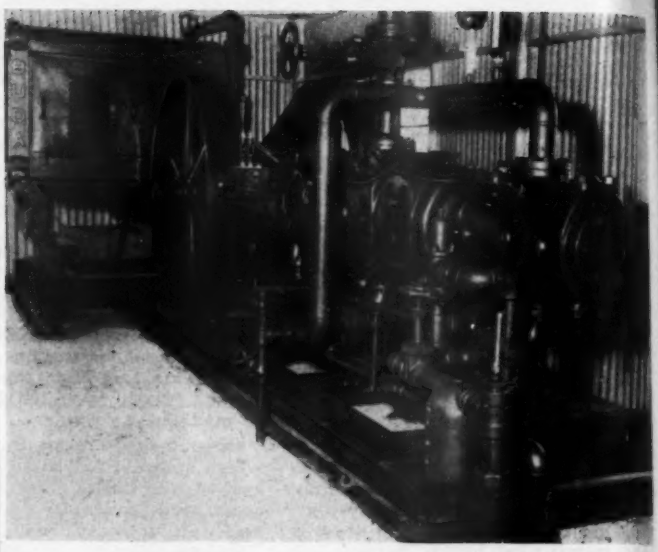

Above: Skid-mounted recompressor and its driving unit. Automatic controls operate to shut down the compressor in case of failure in field gas supply. Left: All processing equipment for the packaged natural-gasoline plant is mounted on a 22 by 8-ft. structural-steel base. The entire plant may be transported with only three trucks.

"Portability"—plus Economy, Featured in

"Packaged" Gasoline Plant

by R. B. Tuttle
Associate Editor

NEW-TYPE gasoline plants for small fields? Or even for economic installation on only one or two leases? And for operation by only one "service man," who merely "looks in" occasionally on the plant?

These questions are not hypothetical design requirements for a hypothetical natural-gasoline plant that the petroleum industry has long wanted. They are the highlights of a recent accomplishment by Portable Gasoline Plants, Inc., Tulsa.

Otha H. Grimes, long-time gasoline-plant operator, is president of the new company. The plant itself is operated under patents issued to L. S. Gregory; design and fabrication is by L. S. Gregory Co., Tulsa.

Case History of New-Type Plant

Heavy installation and operating costs have been the bugaboo in scaling down the conventional large absorption-gasoline plants, to the requirements necessary for small-pool or individual-lease conditions. Say for producing situations where only small volumes of wet gas are involved (500 to 4,000 M.c.f. daily). But "portability" plus economy in operating manpower achieved via automatic controls solved the problem in the instance of Portable Gasoline Plants, Inc. Consider the case history of the first installation by P.G.P.

Only three trucks were needed to load the assortment of equipment making up the plant. After the trucks pulled onto the designed site on a lease in central Oklahoma, in just 3 days the equipment was assembled into a field processing unit. The plant was then adjusted to operate "automatically," to extract 26-lb. R.v.p. natural gasoline from production of three natural-gas wells in the immediate area. For 2 months on stream the packaged unit has been processing an average of 700,000 cu. ft. of gas daily, without continuous attention of an operator. The plant ceases to operate in the event of interrupted gas supply, deviation in pressure, or malfunction of any of its working parts. Entirely foolproof, operations cannot be resumed until the shutdown cause is corrected, once the plant goes down because of some upset in its normal operations.

Operated by Lease Attendant

The company's lease attendant visits the unit to change control instrument and meter charts, replenish lubricating-oil supplies, and make an over-all inspection of plant operations. As a rule these routine duties consume less than an hour. In the event

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the unit is not operating when the attendant makes his visit, he checks for indications of the cause of the shutdown. This check may require up to an hour depending on what and where the causes are. If they are within the unit proper only a few points need be checked. When external to the plant, causes of shutdown are also revealed by a routine check.

To obtain complete portability of the packaged field processing unit, its designers have held sizes of the largest component to legal limits for highway transportation. The plant's largest single part with respect to highway limitations is its base which is fabricated of structural steel and is little more than a heavy skid weighing about a ton. This skid base is adequately reinforced to accommodate the various vessels, piping, and other items—its over-all dimensions are 8 ft. wide by 22 ft. long. Skid bases of this same dimension, incidentally, are used with other packaged field processing units of this type ranging from 500,000 to 4,000,000 cu. ft. daily input natural-gas capacity.

The various vessels, an absorber, still, reboilers, and fractionators, can be transported by the same truck-trailer unit hauling the skid base. Other accessory equipment for the plant may be hauled on two other trucks, one of which is equipped with a winch for installing vessels and other bulky items.

Erection of the absorber, other vessels, and larger-diameter overhead piping is handled with a gin pole and truck winch. Since the piping is prefabricated to very close tolerances and a wide range of "play" is provided in the anchor bolt layout for the different vessels, time required for setting up even the heavier parts of the plant is reduced to minutes. Total weight of the skid-mounted portion of the unit is approximately 20,000 lb. or 10 tons.

Operational layout of the plant does not require heat from external sources such as steam boilers or direct-fired heaters. This is one of the principal reasons why continuous operator attention is unnecessary in running the plant. Heat necessary for operation is generated within the plant proper. This heat is produced with a two-stage compressor in which no intercooling is employed. Temperature of the compressed gas is approximately 300° F. which is not considered detrimental to the valve mechanism of the compressor. This compression unit discharges hot gas to the tube side of the stripper reboiler.

Field gas is delivered to the unit at 160 psig. via a field compressor. Compression of the field gas is necessary in this case because pressure has declined to approximately 15 psig., and that on the gas transmission line to which residue from the plant is delivered, is 155 psi. The pressure drop of 5 psig. or less through the plant is sufficient for its operation in efficiently extracting 90 per cent of the available natural gasoline as determined by low-temperature fractional analysis of the field gas. Field compressors are not needed if pressure is more than 50 psi.

Incoming gas to the plant, after being cooled on leaving the initial compressor, is delivered into the upper section of a two-compartment vessel where condensate is separated and passed to the vessel's lower section. The gas then passes from this separator into the absorber, a two-section vessel with its upper section serving as an absorber and its lower section operating as a reabsorber. Similar to operations of a standard plant, absorption oil is circulated counter current to the incoming rich gas, and stripped gas is taken off overhead from the absorber. Stripped or residue gas passes into a scrubber where any oil carried over from the absorber is separated and returned to the rich-oil stream.

Rich oil may be run into the reabsorber and thence to the still, or it may go directly to the still from the absorber. The travel is dictated by an automatic control, actuated by pressure of the suction line to the recompressor. This arrangement prevents recompressor overloading.

The rich oil is run to the still. In winter, the rich oil moves via a small fin-tube unit which interchanges with

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the recompressor discharge gas and oil stream to maintain the oil at suitable viscosity for proper flow. Stripping in the still is accomplished with counter flowing lean gas obtained from the two-compartment scrubber.

A portion of the stripping-gas stream is heated and then used to power an absorption-oil circulating pump of the reciprocating type. This slip stream to the pump is heated to avoid difficulty with lubrication of the pump. Regulating and control instruments maintain the desired pressure differential so that the pump-powering gas may be exhausted back into the main stream.

A rate-of-flow controller permits only the desired volume of gas to enter the still for stripping. To avoid high recompressor loading within the limits of good economy, stripping gas is maintained at volumes suitable to obtain that end. An over-all balance point relative to operational efficiency and investment economy for this type of plant works out to be 90 per cent recovery by fractional analysis of the gasoline contained in the feed gas. The natural gasoline contains a large per cent of butanes, a small per cent of propane, providing a stable product.

Provision has been made in the plant layout to incorporate equipment for extracting L.P.G. This additional equipment primarily consists of fractionators which can be installed with little change in piping and without alteration to the skid-base since it is designed to accommodate equipment for L.P.G. extraction. The plant may be operated economically to recover a high per cent of propane since no heat is required in the oil circuit. The only additional equipment needed to extract propane is an L.P.G. fractionating unit and a larger recompressor.

The still is operated under vacuum, produced by the recompressor which removes the overhead gas via a scrubber. To prevent condensate or other liquid entering the recompressor cylinders, a mercury switch, actuated by high liquid level in the scrubber, operates to open the primary circuit in the compressor-engine ignition system.

The gasoline make is condensed and cooled with water in tubular-type equipment. Heat picked up by the cooling water in the engine jacket and in processing equipment is removed in an open-type spray pond. Circulation of the cooling water is accomplished with a pump powered from the compressor engine. Water makeup requirement even with this type of cooling is very low, averaging only a few barrels daily under various conditions.

The new gasoline plant is the smallest of four fully automatic plants of this particular type now operating. The unit described is located at the northern edge of Garison pool in 35-11s-9e, Okfuskee County, Oklahoma, approximately 3 miles south of the town of Okemah. The other three plants, two located in Oklahoma (Arcadia and Apache pools) and one in Texas (Trent) are not truly portable but they all operate with the control features provided in the Okemah installation. Actually, the design and operational experience with these other three units contributed appreciably in the development of this newest and truly packaged-type field processing unit.

Penn State Prepares Capillary-Flow Film

A 16-mm. color sound film of about 24-minute length entitled "Microscopic Studies of Capillary Flow" has been produced by the petroleum and natural-gas department of Pennsylvania State College. The film shows the technique used for producing and mounting sand-filled capillaries on microscopic slides and a microphotographic motion-picture study of the flow of air, oil, and water through the pore structure. This may be obtained for $1.25 plus postage and insurance from the Audio Visual Aids Library, Pennsylvania State College, State College, Pa.

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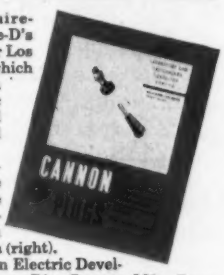

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The Properties of

LOST-CIRCULATION MATERIALS

In this article the authors point out the four common methods of correcting lost circulation. One is described in detail—that of the addition of lost-circulation materials, of which there are two types, to the drilling mud to plug or bridge the formation.

by C. W. Dougan* and C. H. Low

SINCE the inception of rotary drilling, loss of circulation has been one of the most serious problems confronting oil production men. It has given rise to many unusual and often extremely costly drilling operations, and more than one well has had to be abandoned and the rig moved to a new location because of the failure to regain circulation. Records show instances of huge sums of money used up combating this problem.

Because drilling fluid is the medium by which drill chips and cuttings are removed from the bore hole, unexpected termination of circulation can permit the drill cuttings to settle out. This can and does cause the drill pipe to stick. One wonders how many producing zones have been passed up because of stuck and twisted drill pipe.

Correction of lost circulation may be accomplished by four methods. In the order of each step used to achieve correction, they are:

1. The reduction of the mud-pump pressure and the control of the mud properties so as to reduce the weight of the mud column on the thief formation.

2. The addition of lost-circulation materials to the mud to plug or bridge the formation.

3. The building up of a synthetic bore-hole wall by spotting cement adjacent to the offending formation, and subsequently drilling out.

4. Blind drilling, without returns, permitting the drilling fluid to carry the cuttings into the formation.

This article discusses the second method, that of addition of lost-circulation materials to the drilling mud. In general, there are two types of lost-circulation materials: (1) swelling or plugging agents, and (2) bridging agents. Plugging materials have had a very limited success. Bridging agents have enjoyed the most success. Bridging materials form an integral part of the filter cake which forms on the bore-hole wall.

Various substances have been used to combat lost circulation. They include straw, grain, hay, mica, ground rubber, bentonite balls, cane fibers, cottonseed and rice hulls, beet pulp, shredded balsam wood, various chemicals, sage brush, manure, peat moss, asbestos, saw dust, tree bark, vermiculite, volcanic rocks and sundry synthetic products. Some of these are offered as packaged products, others are merely field expedients.

Based on experimental evidence obtained by Great Lakes Carbon Corp., it has been found that the most important property a lost circulation material must have is a well-designed particle-size distribution. It is also essential that it possess other important properties, namely, particle shape, particle weight or density, particle rigidity, and inertness.

Recently acquired data indicate that the proper distribution of the various particle sizes is of utmost importance.

The size of the larger particles necessary for a lost-circulation material depend on the size of crevasse or opening. Inasmuch as ⅛ in. or less is the size of more crevasses the upper size for particles is about No. 8 mesh. The smallest-size particles should be of the order of 0.1 to 0.2μ. Between these extremes the distribution should be such that there is a sufficiency of each size properly to fill in the voids of the next size larger particles.

Therefore a properly sized lost-circulation material should have a size range from 2,000μ or about ⅛ in. down to about 0.3μ. This will give a relatively close-packed mass. Colloidal particles from the clay, starch, or oil emulsion in the drilling fluids supplement the particle sizes of the bridging agent in filling in the submicroscopic voids of the bridging material forming an impervious seal and preventing further loss of mud to the thief formation.

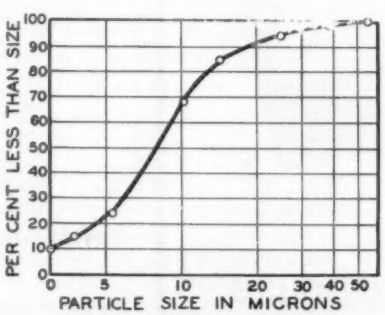

Fig. 1—Particle-size distribution curve of —325 mesh material in Strata-Seal.

Fig. 1 is a particle-size distribution curve of the minus 325 mesh material in Strata-Seal*, a bridging agent to be described further on. This curve is similar to the distribution of sizes found in clays down to 3μ. It should be remembered that clays, in general, contain particles 90 per cent of which are less than 10μ. This preponderance of sizes below the finest particles of Strata-Seal aid in completing the filter-cake seal.

A group of lost-circulation materials of various degrees of particle sizes and shapes was selected for testing. This includes Strata-Seal, shredded cane fibers, shedded balsam wood, and chopped cellophane. The latter three materials rely on formation of a mat, woven into the filter cake.

Also tested were cottonseed and rice hulls which ordinarily are extremely poorly sized substances. These materials were mixed with a pit mud from a nearby oil well at a concentration of 7½ lb. per barrel. Each mixture was tested in a standard A.P.I. filter press used in field work to determine water loss. But since we are chiefly interested in mud loss the standard 80-mesh screen was replaced with a 16-mesh screen allowing the filter cake to form on a base more difficult to bridge. Whenever a seal was obtained the pres-

Material—	Cake thickness	Remarks
Strata-Seal	3/32 in.	
Cane fibers	10/32 in.	
Balsam fibers	11/32 in.	
Cellophane	15/32 in.	
Cottonseed hulls		Failed to bridge
Rice hulls		Failed to bridge

*Trade name of Great Lakes Carbon Corp. for a lost-circulation bridging agent.

*Great Lakes Carbon Corp., Torrance, Calif.

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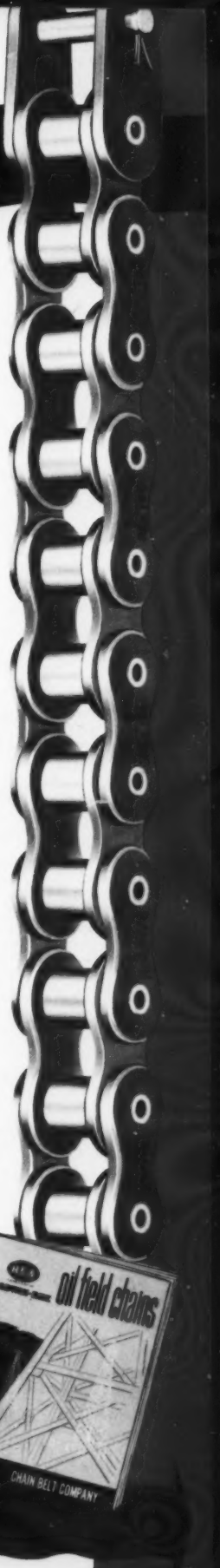

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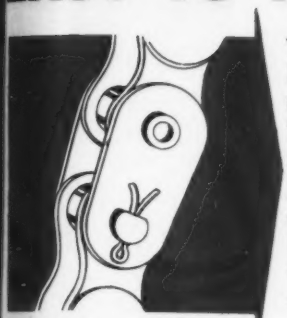

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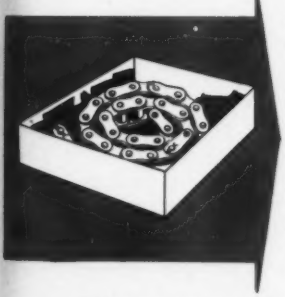

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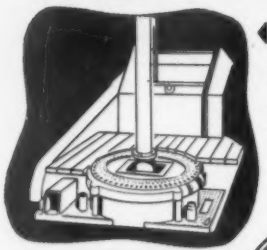

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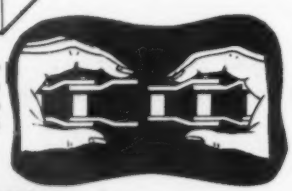
Rex Offset Side Bar Roller Chains have highly finished parts, held to close tolerances.

Rex Offset Side Bar Roller Chains are stocked in boxes in convenient 10-foot lengths.

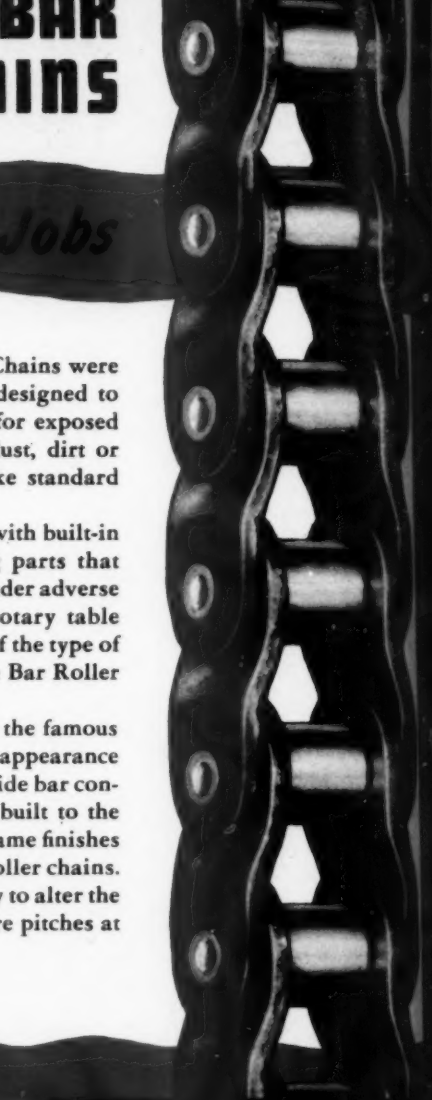


Rex Offset Side Bar Roller Chains are easy to couple . . . to alter length by one or more pitches.

Rex Offset Side Bar Roller Chains were "born in the oil fields" . . . designed to answer the need for a chain for exposed drives where conditions of dust, dirt or occasional misalignment make standard roller chains unsuitable.

These chains are designed with built-in clearances between working parts that enable the chain to stand up under adverse operating conditions. The rotary table drive, for example, is typical of the type of service where Rex Offset Side Bar Roller Chains are the ideal answer.

These chains are similar to the famous Rex A.P.I. Chains in general appearance . . . have the same basic offset side bar construction. However, they are built to the same close tolerances, to the same finishes and dimensions of standard roller chains. The offset design makes it easy to alter the length of chain by one or more pitches at any point in the chain.



REX OIL FIELD PUMPS

the Little Yellow Pumps That:

You find everywhere in the oil fields, doing everything from dewatering ditches to salvaging oil from the pits.

The exceptional all-round portability of these handy self-priming centrifugals, plus their outstanding durability and efficiency, makes them the top choice for oil field utility service.

Pump body is pressed steel that's unbeatable for durability . . . can be repaired by welding. The exclusive Rex adjustable "air peeler" and replaceable wearing plate assure new pump efficiency for the lifetime of the pump. All these *plus* advantages mean better service with less maintenance and repair costs to you.

Rex Oil Field Utility Pumps are available in a range of capacities to fit every oil field service.

Rex Oil Field Sales Offices Are Located in the Following Cities:
NEW YORK • TULSA • DALLAS • HOUSTON • MIDLAND • LOS ANGELES

CHAIN BELT COMPANY

BALDWIN-DUCKWORTH DIVISION
Springfield 2, Mass.

REX CHAIN & TRANSMISSION DIVISION
Milwaukee 4, Wis.

REX CONSTRUCTION MACHINERY DIVISION
Milwaukee 4, Wis.

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sure was adjusted to 100 psi. A tabulation of the results is shown.

Strata-Seal has a cake thickness of less than one-third of its nearest rival. Cottonseed and rice hulls are evenly sized materials, which explains why they failed to bridge. We concluded that since a 3/32-in. cake accomplished the same as 10-15/32-in. cake, a material of good size distribution was superior.

Particle shape is an important factor in bridging an opening or crevasse. The various lost-circulation materials usually possess one of three particle shapes: (1) Plate-shaped, (2) fibrous, and (3) granular.

Plate-like materials form a flexible or nonrigid mat-like bridge over the pore spaces. Colloidal material from the drilling mud tends to fill in the smaller voids. However, plate-like materials are quite difficult to size so that they have a poor particle-size distribution. This allows a considerable portion of the voids that cannot be bridged successfully, and results in a porous to semiporous filter cake permitting the loss of mud.

Fibrous materials are obviously not sized materials but contain fibers of different lengths and diameters. These materials if properly oriented at the opening of a crevasse or pore form a mat-like bridge much like that of platy materials. If such a bridge is formed it will lack the sizes necessary to form an impervious cake. Fibers usually having low tensile strength and being of an organic nature frequently break down under the stress of the differential pressure of the mud column and the fluid pressure of the formation. Hence under conditions of stress, and deterioration, fibers will break and disrupt the filter cake.

Granular materials are better suited to impede or prevent lost circulation since this type material lends itself to more efficient control of particle-size distribution and density. Further, they are usually inert and rigid. They can produce a seal as stable as the bore-hole wall itself.

Strata-Seal is composed of glass-like cellular spheres, much like the marbles used in our particle-size analogy. The shape is ideal for forming a filter cake when combined with proper size distribution.

Particle weight is also an important factor in lost-circulation materials. There has been considerable discussion on whether lost-circulation materials of the bridging type form their seal on the surface of the bore-hole wall, or function at a short distance within the formation, say 5 or 6 in. or more. It was determined experimentally that all bridging action was accomplished on the bore-hole wall, or wherever a seat for the largest particle could be found. The particles which had previously entered the formation would return to the bore hole if a reversal of fluid pressure were permitted, provided the particles were light enough in weight.

Tests were made forcing small particles of Strata-Seal in a bed of shot. It was discovered that the pressure required to remove them was almost nil. This proves to be a valuable asset, since, as previously stated, lost circulation often occurs in a producing zone. Therefore heavy substances and also reactive and organic substances that are subject to swelling jeopardize future production by impeding the movement of gas or oil. Field evidence also corroborates our assertion about Strata-Seal since many wells have had application of it to stop lost-circulation in productive zones. Subsequently several wells exceeded their estimated production rate and in no case have they gone below the estimate.

Materials of an organic nature will, in time, decompose and cause filter cake to disintegrate. This decomposition may be rapid depending on the temperature, pressure, and chemical condition surrounding the formation to be bridged. This often causes the pH to change, thus requiring corrective measures.

It is desirable to direct the mud returns over the shaker screen if at all possible. This removes the drill chips efficiently and keeps the mud in good condition. Many lost-circulation materials are removed by the shaker screen, and therefore it must be completely bypassed. Granular substances have an advantage because most of the particles will pass through a 12-mesh screen and continue to the pit where they can be picked up by the mud pump and recirculated.

Only a small percentage of Strata-Seal will be removed on a shaker screen. Usually operators bypass it for the first 10-12 hours to make sure the offending formation will have a supply of 8-mesh particles, although in certain areas this size particle is not needed.

In many areas lost circulation is a tremendous battle from the surface down to several thousand feet. During this interval most loss may range from 10 to 100 barrels per hour and more, and frequently circulation will be lost completely. One well in Southern California had this identical situation. Here is its well history:

Depth of lost circulation	Corrective measure
400 ft.	50 sacks Strata-Seal
540 ft.	25 sacks Strata-Seal
780 ft.	90 sacks Strata-Seal
1,300 ft.	29 sacks Strata-Seal
losing 2 bbl. hour	
2,640 ft.	47 sacks Strata-Seal

Since the largest pore in the several formations drilled up was under 12 mesh in size, the operator was able to screen during the periods of loss returns, enabling him to make hole rapidly through periods of partial returns as the 12-mesh shaker screen was keeping the mud in good condition and the danger of stuck drill pipe was mitigated. This well was drilled in rather spectacular fashion considering the problems involved. If a good lost-circulation material can be dispersed in the mud during normal drilling operation or at least while drilling in known or predicted thief formations, very often it can be drilled up without the occurrence either of lost circulation or even lost returns.

It should be remembered that freakish, irregular, and unpredictable situations are always cropping up in the drilling business. The lost-circulation situation just described is such a case. They lead operators to face seemingly unsurmountable odds to resolve them. These situations arise regardless of the caution, technical skill, or experience of the operator involved. Another such case occurred recently in the Los Angeles area. In a well which was making hole nicely, the bottom suddenly fell out and circulation was lost. Various lost-circulation materials were tried without success. A cavein occurred at this time, sticking the drill pipe. It was impossible to wash over since additions of fresh mud disappeared. This situation left the operator somewhat puzzled as to what to do next. Strata-Seal was recommended to them, and 140 sacks were mixed with fresh mud and introduced to the well. Circulation was recovered and the wash-over job begun. The fish was recovered and the well completed without further mishaps. Situations like these occur regularly.

In summary, it is believed the reseults reported herein indicate that the properties necessary to an effective lost-circulation material are: (1) a well-designed particle size distribution to form an impervious seal, (2) a granular particle shape to permit control of its particle-size distribution, (3) a light-weight substance to permit it to remain dispersed up to the time it reaches the point of loss and to allow it to be readily ejected from the well at completion time, (4) a rigid particle to give it resistance to compression and shear, (5) inertness to prevent its decomposition by chemical action.

BOOKS

APPLIED SEDIMENTATION. A SYMPOSIUM. Edited by Parker D. Trask. Published by John Wiley & Sons, Inc., New York. 707 pp. $5.

This is a useful handbook for geologists and engineers faced with practical problems of sedimentation. Over 1,000 references appear in the book. The articles are grouped under seven general topics: Basic principles of sedimentation, engineering problems involving strength of sediments, applications of processes of sedimentation, application involving nature of constituents, economic mineral deposits, petroleum geology problems, and military applications. The economic applications of sediments and sedimentary rocks to every phase of geologic activity are treated, including petroleum geology, mining geology, petroleum engineering, engineering geology, and pure geology.

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Above: Man at left operating portable recorder, for electrical correlation work. Right: Drilling equipment, on location.

Electric Correlation Drilling

in the Rocky Mountains

by N. C. Surber* and E. R. Sims, Jr.*

DURING the past the Rocky Mountain area has been prospected primarily through the use of surface geological mapping. In recent years, however, most of the known surface structures have been drilled and geologists have had to turn to other methods of exploration in order to keep ahead in the search for drillable prospects. Much has been written about the use of geophysics in this respect; however, there is another, comparatively little known method which is playing an increasingly important role. Core drilling has been in use for many years, but the scarcity of marker beds in some parts of the stratigraphic section, the difficulty of identifying these markers, the expense of coring, have all combined to limit its application.

Electric Correlation Drilling

Now the use of electric logs for correlation purposes on shallow exploration holes has begun to replace the use of samples and cores, thus greatly speeding up operations, giving much more reliable correlation, and greatly enlarging the scope of the core drill. One concern, Mountain States Exploration Drilling Co., Casper, Wyo., has been using electric correlation for a number of years with complete success and has proposed the name "Electric Correlation Drilling" for this comparatively new exploration method.

*Mountain States Exploration Drilling Co., Casper, Wyo.

Weathered shale areas, or those where thick shale beds are covered by a thick mantle of alluvium in many cases, are particularly well suited to this method of attack. There are many likely looking places for oil prospecting where Lower Tertiary or Upper Cretaceous shales and sandstones such as the Wasatch, Fort Union, Pierre, and Mancos lie in a thick mantle over the underlying beds. Where these beds are conformable with the underlying formations, as is usually the case with the Pierre and Mancos, they are admirably suited to electric correlation drilling. Where the beds are either nonconformable or covered by a thick mantle of alluvium or Tertiary deposits, the thickness of the overlying material is the determining factor as to whether electric correlation drilling can economically be used.

What Can It Do?

Experience has shown that there are distinct and correlatable electrical property differences among the various members of these thick shale bodies, even though they may look exactly alike under the microscope. These electrical properties are sufficiently persistent to permit correlation over a substantial area. With the equipment used in electric correlation work, markers can be found even within parts of the geological section that are normally considered "dead" to ordinary electric logging methods.

With the information obtained from electric correlation logs the geologist can:

1. Carry a set of distinct correlation markers, even on some very thin beds, across an area that cannot be worked on the surface.

2. Pick up thickening or thinning in beds due to rapid changes in dip.

3. Detect faulting.

4. Combine coring with electric logging to work areas of shallow unconformity, where identification as well as subsurface contouring is required. Usually once the unconformable layer has been penetrated, the greatest problem is correlation of the underlying formation. Here the electric log again proves its worth.

5. Aid in avoiding dry holes in development drilling of a proven field where faulting controls or affects accumulation. A few shallow holes in

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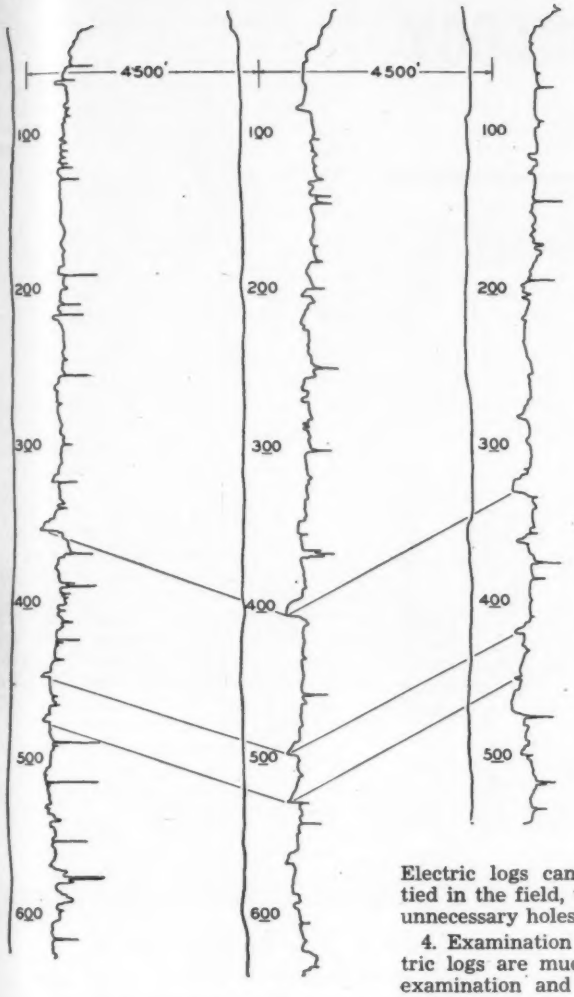
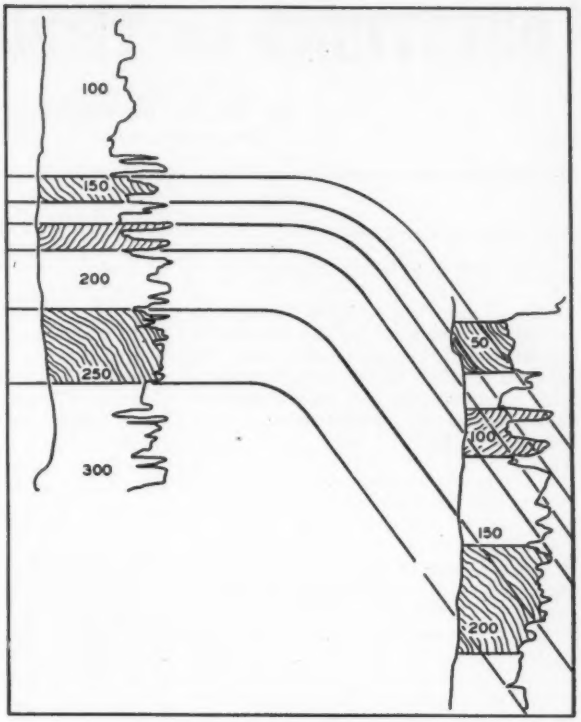




Above: Correlation, Mancos shale.

Left: Correlation of Pierre shale.

strategic parts of the field can often pick up the fault planes. These will permit projection of the fault planes to the producing horizon. The resultant data may suggest shifting a location, or completely eliminate a proposed outpost well which would have been a dry hole.

6. Supplement surface geology by delineating partially covered surface structures.

7. Map vast weathered shale areas which cannot accurately be mapped from the surface.

Advantages of Electric Correlation Drilling

Electric correlation drilling has several advantages over other methods of exploration and over the conventional core drill methods of working samples and cores. Some of these advantages are:

1. Correlation points are definite and not subject to change due to differences in individual interpretation.

2. No intensive specialized training is required for interpretation.

3. There is no waiting time between the time the work is done and the time when the data are available. Electric logs can be correlated and tied in the field, thus tending to save unnecessary holes.

4. Examination and storage of electric logs are much simpler than the examination and storage of samples and cores.

5. The small amount of time required for correlation of logs allows the company geologist more time for interpretation of results.

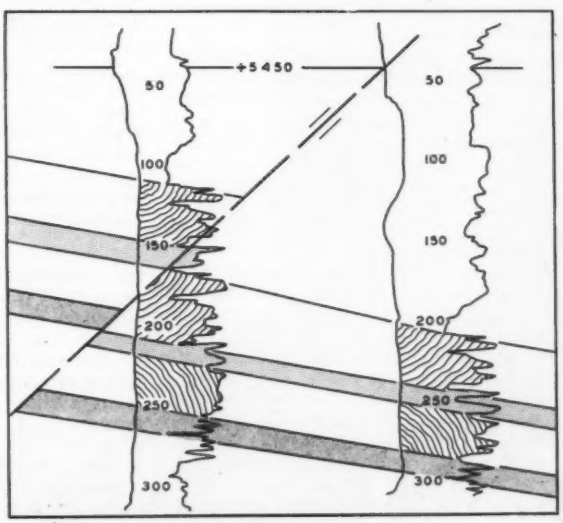
Formation Markers

How do the various formations compare as to ease of picking reliable markers? Conditions will vary somewhat, of course, but Mountain States Exploration Drilling Co., from experience, rates them about as follows:

Mancos shale.— This formation and its equivalents gives excellent correlation with hole depths of 200 to 300 ft. Holes spaced 2 and 3 miles apart are often correlated, and occasionally holes as much as 5 miles apart are tied. This is unusual, however, because even a small amount of dip will necessitate closer spacing of holes.

Upper Pierre. — This contains distinctive electrical horizons and can be satisfactorily worked. Generally speaking, 400 to 600 ft. of section is necessary to get dependable correlation. Geologists familiar with the

(Continued on page 94)



Example of thrust faulting in Mancos shale.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Height of Packing for Hydrocarbon Absorbers

Have any data been published which may be used for the estimation of the height of a transfer unit for packed towers filled with commercial packings used as absorbers for multicomponent hydrocarbon systems?—R. E. S.

This question illustrates very well the apparently increasing tendency of chemical engineers to be satisfied with complicated formulations without bothering to check the formulation of hydrocarbon absorption, there are few experimental data.

If laboratory or plant data are not available as the basis for a new design, the process engineer must resort to empirical relationships. This is particularly true of diffusional operations involving multicomponent systems. Perhaps the best relationship now available is that of J. B. Maxwell in his "Data Book on Hydrocarbons" (D. Van Nostrand, 1950). He presents a chart on page 246 which gives the height equivalent of a transfer unit (HETP) in terms of packing size and tower diameter and which presumably applies to the design of an absorber handling a complex hydrocarbon system. Table 1 on this page indicates the ranges covered by Maxwell's chart.

Maxwell's chart indicates that HETP varies directly as $d^{0.5}$ (d = nominal packing size in inches), directly as $D^{0.33}$ (D = tower diameter in inches), and inversely as tower loading.

Other authorities are in substantial agreement as to the effect of tower diameter, indicating that HETP varies directly as $D^{0.3}$. However, with regard to packing size, some authorities indicate that HETP varies directly as "d," and with regard to loading, that HETP would tend to vary inversely as the 0.8 (or less) power of loading.[1,2]

The apparent disagreement of these data may be due in part to the method of calculating the number of theoretical plates or stages necessary. A method of calculating the number of theoretical plates proposed by Kremser and modified by Sanders and Brown in outlined in Petroleum Refinery Engineering, pages 734-740, third edition (McGraw-Hill Book Co., 330 West 42nd Street, New York, 1949). This is the method generally employed in designing absorbers for complex hydrocarbon systems because the equilibrium and diffusional data required by other methods are usually lacking.

When the necessary data are available, the HETP should be calculated from individual liquid and gas film coefficients by conventional theoretical methods such as those outlined in Perry's "Chemical Engineer's Handbook (McGraw-Hill Book Co., New York).

1. "Heat, Mass Transfer of Gas Film in Flow of Gases Through Commercial Tower Packings," R. G. Toecker and O. A. Hougen, Chem. Eng. Progress, 45, No. 3, March 1949, pages 188-193.

2. "Gas Absorption—Mass Transfer Coefficients as Function of Liquid, Gas Rates, Tower Packing Characteristics," L. E. Hutchings, L. F. Stutzman and H. A. Koch, Jr., Chem. Eng. Progress, 45, No. 4, April 1949, pages 253-268.

TABLE 1—APPROXIMATE HETP OF PACKED TOWERS*

Tower diameter (in.)	Height equivalent of a theoretical plate, inches			
	¼-in. packing	¾-in. packing	1½-in. packing	3-in. packing
3	5.0	...	...	...
6	5.7	9.8	...	...
10	6.2	10.7	...	...
20	...	12.0	17.5	24.5
40	...	...	19.7	28.0

*Based on Raschig rings and Berl saddles. Loading is approximately 95 per cent of the reported "flooding" capacity for the capacity chart or equation of J. B. Maxwell.

Effectiveness of Additives in Various Kinds of Oils

The use of additives is hampered by the different behavior in oils of different origin. I would be interested to know if a correlation has been found between the effectiveness of additives and the properties of the oil such as characterization factor, V.G.C., sulfur content, etc.? A. P.

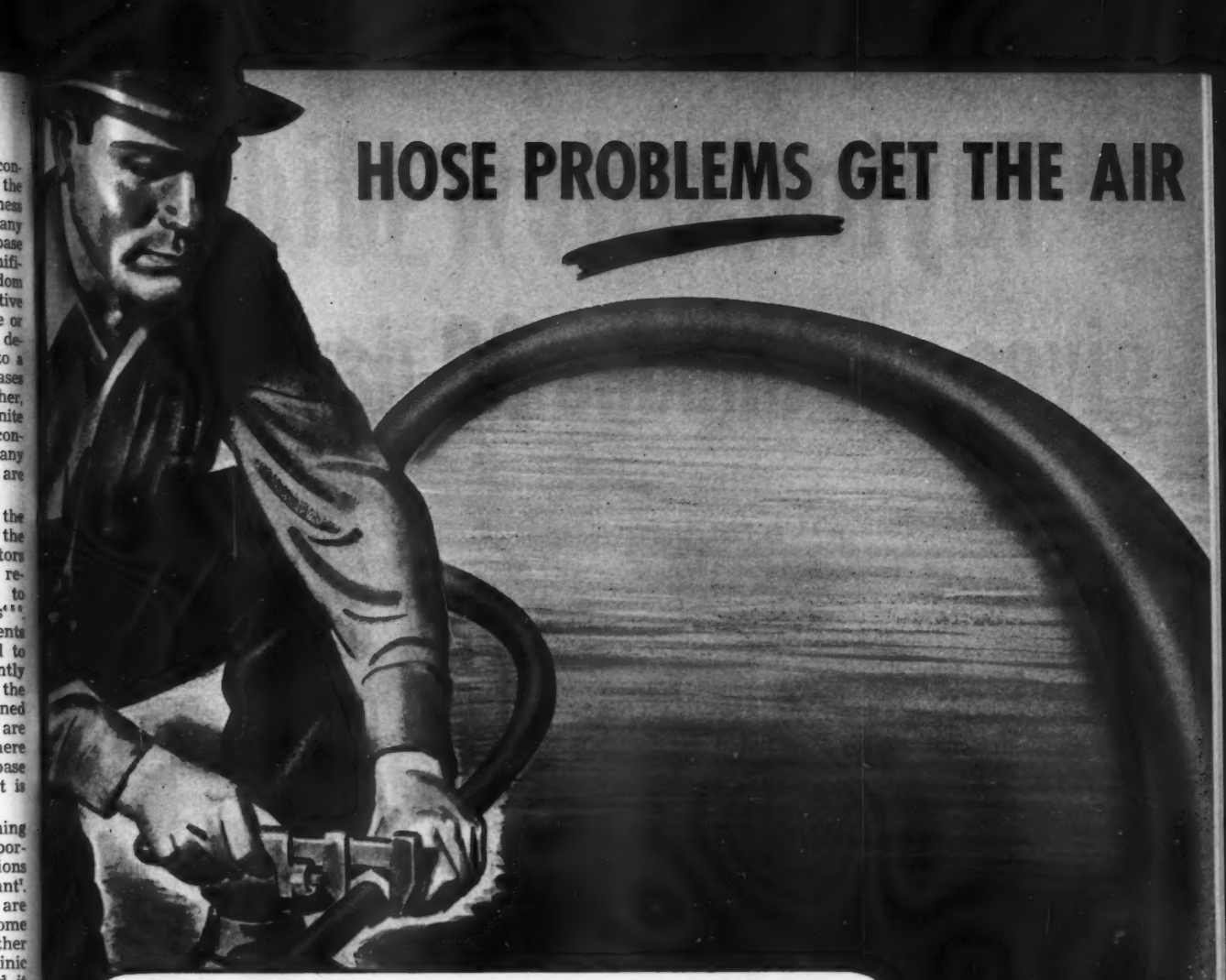
A list of additive types available for compounding with lubricating oils, as well as the characteristics which would be changed by these additives, reveals that there are approximately 51 characteristics of lubricating oils which can be affected by additives[1]. Many additives affect several of the properties of the oil as well as the property for which they are prescribed. Something over 2,000 U. S. patents relating to additive materials have been issued.

From these facts it is not at all surprising that scarcely any generalized statements have been made concerning the relationship between the base of an oil and the effectiveness of additives. Although there are many statements to the effect that the base of the oil is important or significant[1,2,3,4,5], the statements are seldom specific even when only one additive is considered and when the engine or operating conditions are closely defined. This may be due in part to a reluctance to rate the various bases or brands of oils against one another, but it is felt the lack of definite statements is due to the natural confusion that exists when so many factors besides base of oil are involved.

A most important variable is the degree and kind of refining that the oil has undergone. Many investigators report that unrefined or lightly refined oils are less susceptible to additives than highly refined oils[1,6]. This seems to lead to improvements when an additive is administered to a treated oil that are apparently very great as compared with the effect on other less highly refined oils. If oils of a different base are involved in such a comparison, there is some doubt as to whether the base of oil or the degree of refinement is to be credited with success.

Undoubtedly the degree of refining practiced on the oil is very important[3,4,5,6,7]. Also, the engine conditions or condition of test is important[1]. Naphthene or mixed-base oils are reported to be superior under some specific conditions[6,7] whereas in other situations, Pennsylvania or paraffinic oils are said to be superior[1,5], and it is clear that claims may be made for any base of oil if the conditions or situation or the particular additive is properly selected. Even the kind of gasoline used in the engine may be significant[1]. Gasolines which exhibit a large difference in octane number by the motor and research methods are apt to cause the formation of more engine deposits than other gasolines (undoubtedly meaning "under some conditions"). "It might be pointed out at this time that to the author's knowledge there are no oils on the market today which can keep an engine clean if gasolines of certain properties are used under certain conditions"[1]. Zuidema[7] points out that copious precipitation of oxidation products may occur when "fresh paraffinic oil, e.g., Pennsylvania or solvent-extracted Mid-Continent, is added to an oxidized naphthenic oil, e.g., California, but may also occur when a fresh oil is added to oxidized material of identical original composition." Such statements certainly should not be taken as being generalities. Apparently the oiliness characteristics of mineral oils, irrespective of the base from which the oil was derived, are the same[8].

In the face of all of the above claims, each of which pertains mainly to a specific application, it seems clear that nothing useful can be said about



HOSE PROBLEMS GET THE AIR

QUAKER HOSE LASTS FIVE TIMES AS LONG

Hundred degree temperatures and plenty of twisting, crushing and abrasion were killers to air hose in a Texas installation. The usual air hose lasted only two or three weeks.

Then QUAKER Blue Devil Air Hose was connected to the compressors. The result! Seventeen weeks of continuous, rugged service and QUAKER was still on the job. Life expectancy of this hose . . . at least 25 weeks!

Performance like this is typical of QUAKER Hose throughout industry—and that's why QUAKER Hose is standard equipment in leading plants throughout the country.

QUAKER'S full line of pre-tested hose meets every Petroleum Industry need.

BELTING FOR LOWER-COST HANDLING

Regardless if you are moving bulk materials or package goods, there is a QUAKER Conveyor Belt to do the job.

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QUAKER Packings are engineered for every industrial application—for pumps, compressors, water, air and steam lines.

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QUAKER RUBBER PRODUCTS

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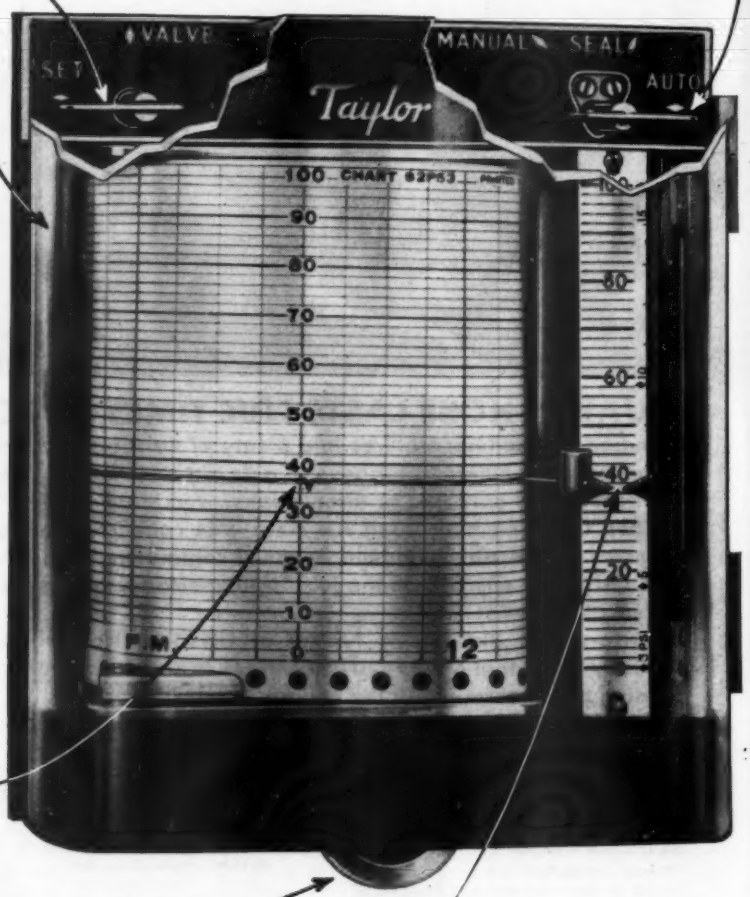
Taylor's New Midget gives continuous 30-day chart

MOVING THIS LEVER FROM NORMAL "SET" POSITION TO "VALVE" CAUSES SET-POINTER (extreme right center) TO INDICATE CONTROL VALVE OPENING.

AUTOMATIC-TO-MANUAL UNIT

STREAMLINED CLEAR PLASTIC DOOR ENCLOSES ALL ADJUSTMENTS, YET GIVES FULL VISIBILITY OF CHART, SET-POINTER, AND WHETHER ON AUTOMATIC OR MANUAL CONTROL.



ACTUAL SIZE 4 3/8" x 5"

THREE HOURS OF CONTINUOUS RECORD, FULLY VISIBLE ON RECTILINEAR CHART

SET-POINT ADJUSTMENT

PROCESS CONTROL POINTER (left) DIRECTLY CONNECTED TO PEN, GIVES INSTANT COMPARISON WITH SET-POINTER (right).

HOLD IT RIGHT UP TO YOUR OWN PANEL BOARD

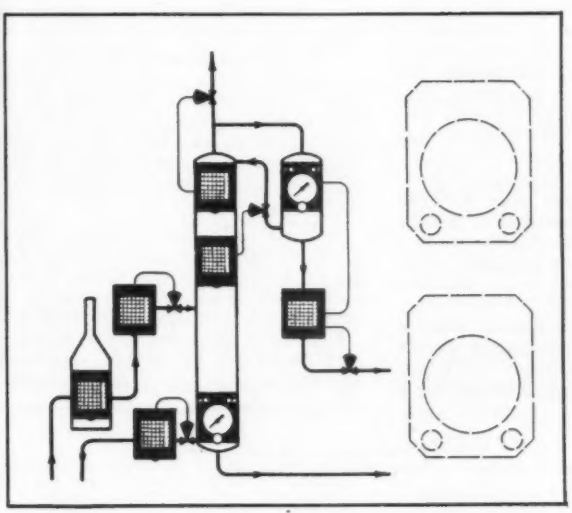
TRANSET* RECORDER

record on 4 3/8" x 5" panel space

THIS tiny (4⅜ x 5") pneumatic TRANSET RECORDER for flow, liquid level, pressure and temperature, greatly simplifies the most complicated central control problems. It indicates and records in the same space required by a conventional-sized indicator alone. And it eliminates receiver wings on even the most up-to-date central control panels (particularly graphic panels).

The TRANSET RECORDER gives a continuous 30-day process record with three hours visible—remote setting of control point—automatic-to-manual unit—instant check on controller performance—and control valve position—*all these*—right where you want them!

1. **Automatic-manual unit**
2. **Remote set-point adjustment**
3. **Valve position indication**



Graphic Panels realistically relate instrumentation to the process. This scale drawing shows how Transet Recorders and Indicators remotely show all the essential process data and take no more space than indicating receivers alone—**eliminating the need for space-stealing wings.**

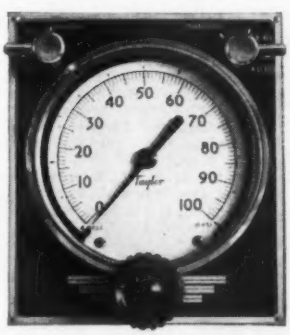
HERE ARE A FEW UNIQUE ADVANTAGES:

1. **Easily removable chart-drive mechanism for reloading. Automatic current cut-off (optional).**
2. **Chart rewind (optional).**
3. **Scale shows actual transmitter process range—is graduated 3-15 psi. for checking calibration and valve position.**
4. **Automatic-to-manual feature gives easy start-up—makes it easy to service controllers.**

You Can Get These 4 Models: (1) One process record, set-point indication, set-point adjustment, valve position indication, and automatic-to-manual unit. **(2)** One process record, valve position indication, and remote manual valve loading. **(3)** One process record only. **(4)** TRANSET Indicator—operation same as Recorder only with indication instead of 30-day chart record.

Yes, Taylor has a TRANSET INDICATOR too!

Fits into the same panel cut-out as TRANSET RECORDER. Many parts interchangeable with TRANSET RECORDER. Available with or without Automatic Manual and remote control point setting.



For Complete Details, Send for Bulletin 98079. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*

* Registered Trade-Mark

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

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the general relationship of "base" to "additives." Each lubricating oil reacts somewhat differently to the addition of a specific additive depending not only on the source of the lubricating oil, but upon the refinement that it has undergone, the engine or engine conditions to which it is exposed, the kind of gasoline used, etc. The manufacturer of each particular additive should best be able to state whether or not his additive should be used with paraffinic or naphthenic or solvent-treated lubricating oils. Unfortunately, even the manufacturers seem unprepared to make the decision without recourse to experiments.

Finally, a most general fact might be pointed out. Many additive agents contain an organic group or radical of a hydrocarbon nature which is included as a means of causing the agent to be soluble or compatible with the lubricating oil[9]. If the solutizing radical of the additive molecule is predominantly paraffinic, then it would be expected that the agent would dissolve in paraffinic lubricants whereas if it were predominantly naphthenic, it would be expected that the agent would be most compatible with naphthenic lubricants. All of this is most confusing because we believe that both paraffinic and naphthenic lubricants contain primarily cyclic or naphthenic molecules rather than paraffinic ones. Scarcely any field of petroleum chemistry would seem to hold more opportunities of promotional development than the field of additive agents.

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Electrical Installations

(Continued from page 68)

and input horsepower (Fig. 2). The 66 per cent efficiency curve, recognized by some authorities on oil-well electric pumping, is plotted to illustrate that reasonable safety is provided by using a 66 per cent over-all surface-equipment efficiency when selecting electric motors, if the polished-rod horsepower has been accurately determined.

With the present electrical-powered pumping units, it is estimated that Gulf will recover 1,420,000 gross barrels of oil above standard-rig operations.

The economic limit with standard rigs would be in May 1954, and the economic limit with electric pumping units will be in June 1960; thus the economic productive life of the field has been extended approximately 6 years and 1 month.

Estimated Pay Out for Project

Estimated production for the last 9 months of 1949 based on decline curve for gas-engine-standard rig would have been 244,500 bbl. Actual production for this same period was 261,912 bbl. or a calculated increase of 17,412 bbl.

Total production expense for last 9 months of 1949 (electrified) showed a net decrease of $20,245 from first 9 months of 1948 (all gas-engine-standard rig). These specific 9-month periods were used as they represented the last 9 months of full standard-rig operation and the first 9 months of complete electric operations.

COMPARISON OF 9 MONTHS STANDARD-RIG OPERATIONS WITH 9 MONTHS ELECTRIC-UNIT OPERATIONS

Actual savings in operating cost—last 9 months of 1949 (completely electrified) compared with first 9 months of 1948 (all standard rigs)	$20,245.00
Nonrecurring charges made in last 9 months of 1949 which can be added to savings in operation cost in future periods	10,591.00
Oil increase last 9 months (electrified) compared to projected production curve (gas-engine-standard rig) 7/8 oil 15,235 bbl. at $2.06 per barrel	31,686.00
Total 9 months revenue gain	62,524.00
Average revenue gain per month	6,947.00

Of the total charges to well and lease repairs during the last 9 months of 1949, there was an increase of $10,591 due to closeout charges from the electrification authorizations and which are nonrecurring charges. This amount covers moneys paid to contractor for dirt work around rigs, fills, road work, etc.

Reference to job cost analysis shows the total expenditure was $292,993. An actual revenue increase of $51,933 for 1949 was realized, which leaves a net unpaid balance of $241,060 on the electrification project as of January 1, 1950.

Projecting the production decline curves for present operation conditions and conditions prior to electrification, the following information is developed:

Year	Estimated revenue gain	Production expense savings due to electrification operations	Total revenue gain
1950	$17,600	$50,000	$ 67,600
1951	16,000	63,000	79,000
1952	12,800	75,000	87,800
To Feb. 1, 1953	750	5,910	6,660
			$241,060

On this basis, the unpaid balance of $241,060 will be paid out February 1, 1953. The pay out period of 46 months or 3.83 years, from April 1, 1949, covers the entire amount of $292,993.

No specific field should be seriously considered for electric pumping until a thorough engineering study has been made and definite economic gains can be shown by the conversion of other types of equipment, or the initial installation of electrical equipment. Each field will be a problem of its own and until a survey is made it is impossible to say whether or not electric power would be advantageous.

In the Smackover field, along with other considerations, the decision to electrify was influenced by the close spacing of wells, making it possible for one pumper to look after a large number of wells when operated by electric power.

It can readily be seen that no fixed formula can be applied to tell when or where electrification is feasible.

Some limitations and advantages which it may be well to consider while making a survey for electrification possibilities are listed:

Limitations:

1. Electric-pumping equipment is inherently inflexible. Pumping speeds can be varied only by changing the pulley ratio. In a prorated field, should a well get behind on production, this could cause an increase in labor cost.

2. Motor size must be rather closely selected to fit the present load. Where fluid production is expected to increase, gas-engine equipment is normally sized to take care of this. With electric motors sized a great deal above present load, efficiency is sacrificed.

3. Electrical energy cost cannot compete with reasonably priced fuel gas on fuel costs alone. Other factors must enter to cause a decision to be made in favor of electricity over gas.

4. In some areas the power contract regarding rates, ownership, and maintenance of primary system including transformer banks are much more favorable to the customer than in others.

Advantages:

1. Lower initial investment for equipment.

2. Lower maintenance cost.
3. Pumping loads can be easily measured.
4. Proper counterbalancing is simple.
5. Less downtime due to prime-mover trouble.

Sholem Alechem Gasoline Plant

(Continued from page 61)

pressure increases the value of crude oil sold. The gathering system is now operating at about 10 psi.

The compressed gas passes from the compressors to the absorber where the liquids are extracted. The residue gas goes from the absorber to transmission lines after being dehydrated in a solid-desiccant unit.

Rich oil from the absorber is flashed into a reabsorber-contactor near the midpoint of the tower. In the contactor section it is mixed with vapors from the raw-feed gasoline make tank to stabilize the rich oil with respect to methane and ethane content.

The rich oil is then fed to the high-pressure still (175 psi.) and the vapors are condensed and sent to raw-feed tank. The partly stripped rich oil goes to the low-pressure still where vapors are taken off at 50 psi. Vapors from the low-pressure still are condensed and join the raw-feed gasoline from the high-pressure still and enter the fractionation section of the plant. Separation into various components takes place in three columns—a deethanizer, a depropanizer, and a debutanizer-stabilizer. The columns are sized to make a commercial propane and commercial butane, or L.P.G. and gasoline from 14 to 26 lb. R.v.p.

Products are transported by truck from the plant. An alternate transportation method is through two products lines that have been laid from the plant to Duncan, Okla., 25 miles from the field. This plan reverses the normal procedure of laying a railroad spur to the plant site and was necessary because of the hilly terrain for the distance between the nearest rail line and the plant. All storage is at the plant and will hold 5 days' design production.

At the present time the field gas has a gasoline content of 1.1 gal. per thousand cubic feet. The content is lower than the 1.7 gal. per thousand cubic feet planned for originally, because of the high separator pressures being used in the field. The 1.1 yield was expected to be reached at full field production after the majority of the field wells had been producing for a considerable time.

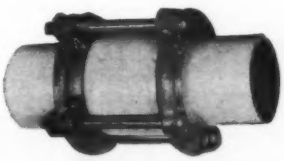
Auxiliaries

Plant auxiliaries include shell-and-tube condensers throughout, except for radiator-type jacket-water coolers, and an induced-draft-type cooling tower. The steam plant consists of 250-psi. 500°F. boilers. The low-pressure lean-oil pump is steam-turbine driven; boiler feed pumps are steam-driven reciprocating. All steam facilities are operated full-condensing with condensate returned to boilers, so that the only water losses are through blowdown and leakage. Three water wells close to the plant site provide any makeup water needed.

Power for driving process and circulating pumps is generated by gas-engine-driven generators that furnish 888 kw.

The compression equipment includes six 1,100-hp. units operated in three stages. A full basement is beneath the compressor building to house piping. Key personnel are housed in a camp near the plant; a total of 38 employes are used, including 8 operators, 7 utility men, 8 oilers, and 3 assistant operators.

The plant is located in Stephens County, Oklahoma, 25 miles southeast of the town of Duncan and north of the town of Healdton. The plant site is nearly on the line between Stephens and Garvin counties. The plant is operated by Magnolia Petroleum Co. for the Sholem Alechem producers including Atlantic Refining Co., Stanolind Oil & Gas Co., Champlin Refining Co., Amerada Petroleum Corp., and others.



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Styles 4 and 41, for repairing and preventing leaks through threads of screw collars.

BAND CLAMP
Style 77B, for repairing small leaks and holes in the run of pipe.

FIX LEAKS-without shutting down

Keep line contents moving while you stop leaks. Just put a Dresser Repair Clamp around the leaking pipe and tighten the bolts. Dresser Grade 29 Gaskets offer you special advantages for a permanent leak-proof seal.

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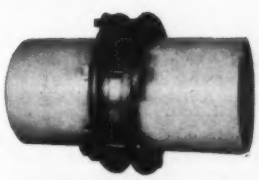
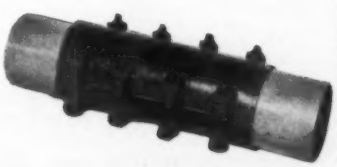


POROUS-WELD CLAMP
Style 55, for repairing circumferential weld leaks.



SPLIT REPAIR CLAMP
Style 79B, for repairing pitholes and longitudinal splits in pipe.

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XUM

Electric Correlation

(Continued from page 87)

Pierre and who have tried to work it on the surface will not be surprised that it is difficult; they may be surprised that it can be worked at all satisfactorily.

Lower Pierre.—This formation contains more distinctive horizons and can be correlated on considerably less footage.

Other beds.—Experience in Wasatch, Fort Union, and other Tertiary beds is limited; it is felt that they can be correlated, but close hole spacing might be necessary.

The geologist generally wants to know how much it will cost to work a given area in terms of dollars per square mile, and how much the total cost of the project will be. That requires a study of the specific project because there are different factors affecting cost, some of which the contractor cannot control.

Naturally the contractor's cost is affected by such surface conditions as topography, accessibility, distance to water supply, and weather, all of which have a direct bearing on the cost of getting equipment and crews to the surface location. Then there are certain subsurface conditions, such as hardness of formations and steepness of dips, which will affect the speed of drilling any given footage once the equipment is on location.

Then there are geological factors arising from the kind of information desired. Primarily these will be (1) thickness of section required to be drilled to get good correlation, and (2) the density of hole spacing required for the desired control.

On the basis of experience, the contractor can give limits within which the cost per foot of hole drilled will fall. Then in conference with the geologist, some reasonably close estimates can be worked out for any given project.

Under poor conditions from the contractor's point of view, such as accessibility, hard-rock drilling calling for rock bits, excessive circulation trouble, etc., the cost per foot may run $3 or even higher. On the other hand, the shale areas where drilling conditions are nearly ideal, can, during the summer and fall months, be drilled for only a fraction of the above cost. Contracting a crew on a time basis will cost from $6,500 to $9,000 per month, depending on the type and size of equipment used. Footage drilled per month can range from as little as 3,000 ft. to over 12,000 ft. under good conditions.

Logging Technique

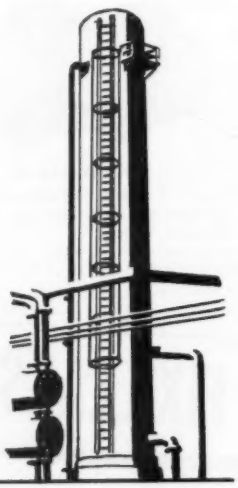
The electric-logging equipment used in these electric correlation holes differs from the conventional because it is for a different purpose and designed to be used under different conditions. There is no need for permeability or fluid-content data on the formations logged; but there is desired distinct and sharp separation if possible, on very thin formations.

Therefore the single-point resistance method is used with the instrument having variable resistivity and potential controls located externally. This is necessary so that the sensitivity can be varied quickly if the formation resistivity changes radically. This makes it possible to bring out electrical characteristics which might otherwise be lost.

The unit must be rugged and have a maximum portability because rough handling is almost unavoidable in the field, and fast moves in rough terrain are common. Simplicity of operation is desirable, because unforeseen circumstances may make it necessary for a tool pusher, driller, or other person unfamiliar with the instrument to take over its operation. The entire unit should be designed for one-man operation from start to finish, in order to keep costs at a minimum.

The recording instrument must have a range of sensitivity sufficient to accommodate all formations. Sensitivity controls should be located on the instrument panel where changes can be made with a minimum of effort and time. Pen-and-ink recording traces are preferred over photographic because of the greater ease of field operation and handling.

Simple circulation method cuts equipment cleaning time 50%!



IN AN attempt to increase the production capacity of his processing units, a Texas operator tried cleaning his equipment with live steam and hot water. This method proved ineffectual... costly. The Oakite Technical Service Representative was called in. He studied temperatures, pressures, deposits. He recommended a specially designed Oakite cleaner for quick, easy circulation through the entire system... absorber, heat exchanger, still preheater.

Result? Cleaning time cut in half! The penetrating power of the Oakite detergent broke through the carbonized deposits, grease films and basic sediment... product flow was smoother, output greater.

Oakite continuous circulation cleaning of processing equipment can save time and money for you! Ask the Oakite Representative near you for complete, free details of the method as it applies to your processing cycle. Or write for Oakite Petroleum Digest of 88 cleaning jobs. No obligation.

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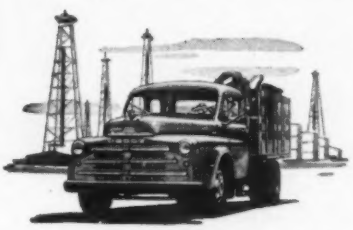
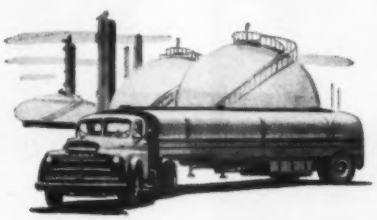
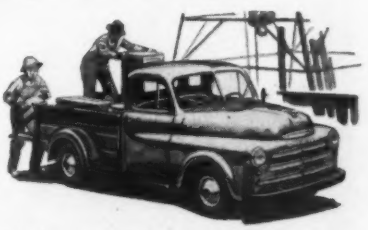
See your Dodge dealer. He'll offer you a good deal and show you why a Dodge "*Job-Rated*" truck is the pet truck for "pet" products.



Dodge builds "*Job-Rated*" stakes with G.V.W. capacities from 5,800 to 17,750 lbs. Drivers like the short wheelbase maneuverability; the "Pilot-House" cabs, with the "Air-O-Ride" cushioned comfort of their "knee-level" seats.



Your dealer has husky tractors like the one above in 1½- to 4-ton sizes. He can supply you with special tank bodies on "*Job-Rated*" chassis. 4-ton models feature 377 cu. in. engine with twin carburetion, and many other features.



Dodge "*Job-Rated*" pick-ups in ½-, ¾- and 1-ton sizes are available with gyrol Fluid Drive for greater smoothness, longer life. Only Dodge builds "*Job-Rated*" trucks. See your Dodge dealer for a good deal . . . all ways!

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OPERATING IDEAS

Track Made of Tubing Simplifies Racking

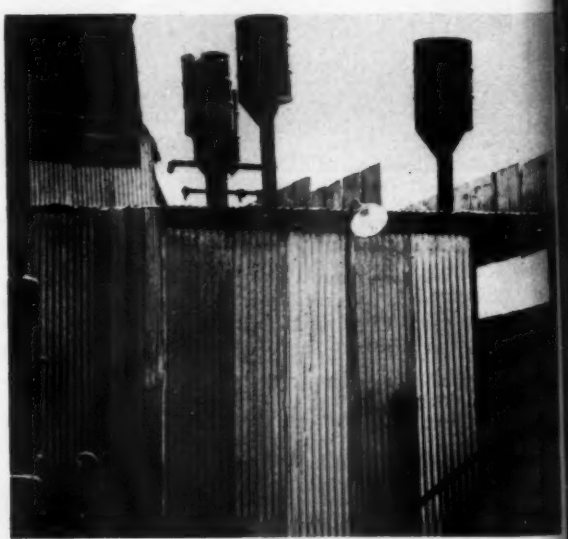
WHEN it is necessary to handle tubing from the hole in "singles," a cluster of the first five joints pulled can be used as a track on which to skid the remaining tubing as it is pulled. The first three joints are laid side by side and held in place by large spikes driven into the rack. Two more joints are laid on top of these to form the track. As each joint is pulled, the lower end of the joint is placed on the track and skidded down it as the joint is lowered. It then is rolled over on the tubing rack in line with the other joints.

Tool Rack Is Convenient Mount for Warning Bells

THIS handy tool rack affords a convenient mount for engine warning bells. Through a solenoid wired to the fuel gages, the driller is warned by these bells when his engines need attention. Current for the bells is furnished by 6-volt dry-cell batteries.

Collapsible Stairs Speed Rigging Up, Tearing Down

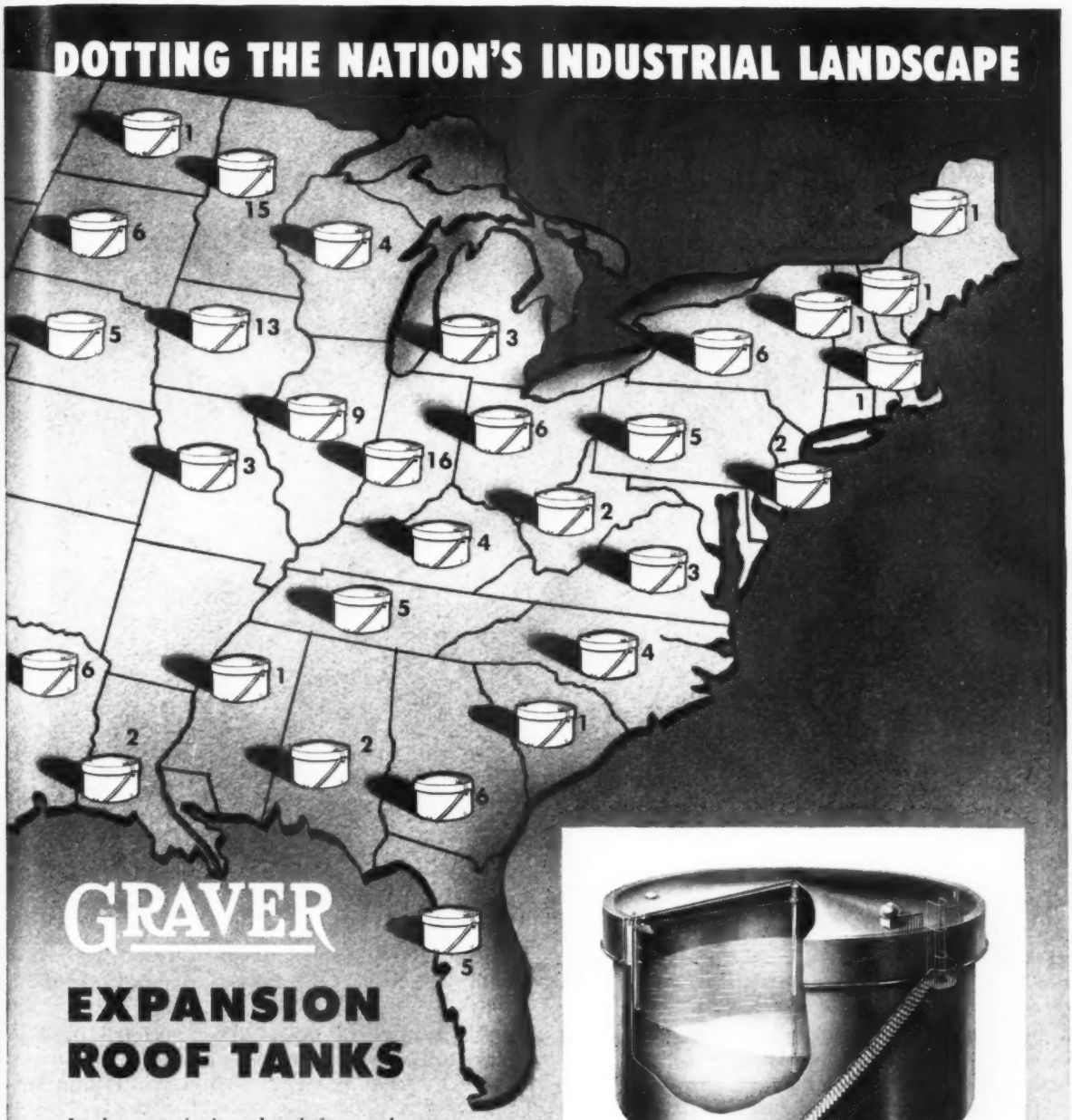
RIGGING-UP and tearing-down time can be reduced materially by use of the collapsible steel stairs shown here. The stair material is standard-gage walkway plate, welded to 3/16-in. steel supports. The top step is twice the width of the others, allowing a steel overhang which acts as a top support for the stairway. The hand rails are made of 1¼-in. steel pipe and are bolted to the channel-iron frame. When tearing down the unit, the hand rail is unbolted and the steps collapsed into a small form



Oil Drums Used to Quiet Drilling-Engine Exhausts

DISCARDED oil drums have been found useful as mufflers for drilling-engine exhausts. The drums are mounted above the engine shed, as shown in the accompanying photograph. This setup does not eliminate the conventional mufflers mounted at the engines, but the drums serve to further reduce engine-exhaust noises. Small triangle braces welded near the ends of the exhaust pipes form a seat for the empty drums. Holes cut in the tops of the drums allow outlets for the exhaust gases.

DOTTING THE NATION'S INDUSTRIAL LANDSCAPE



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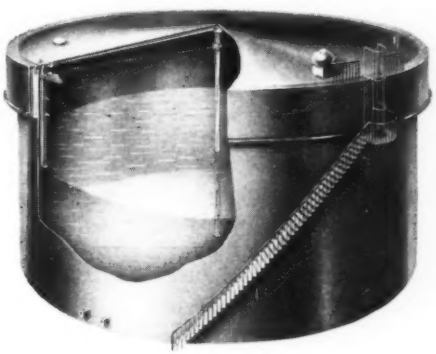

Cut-away view of the Graver Expansion Roof Tank.

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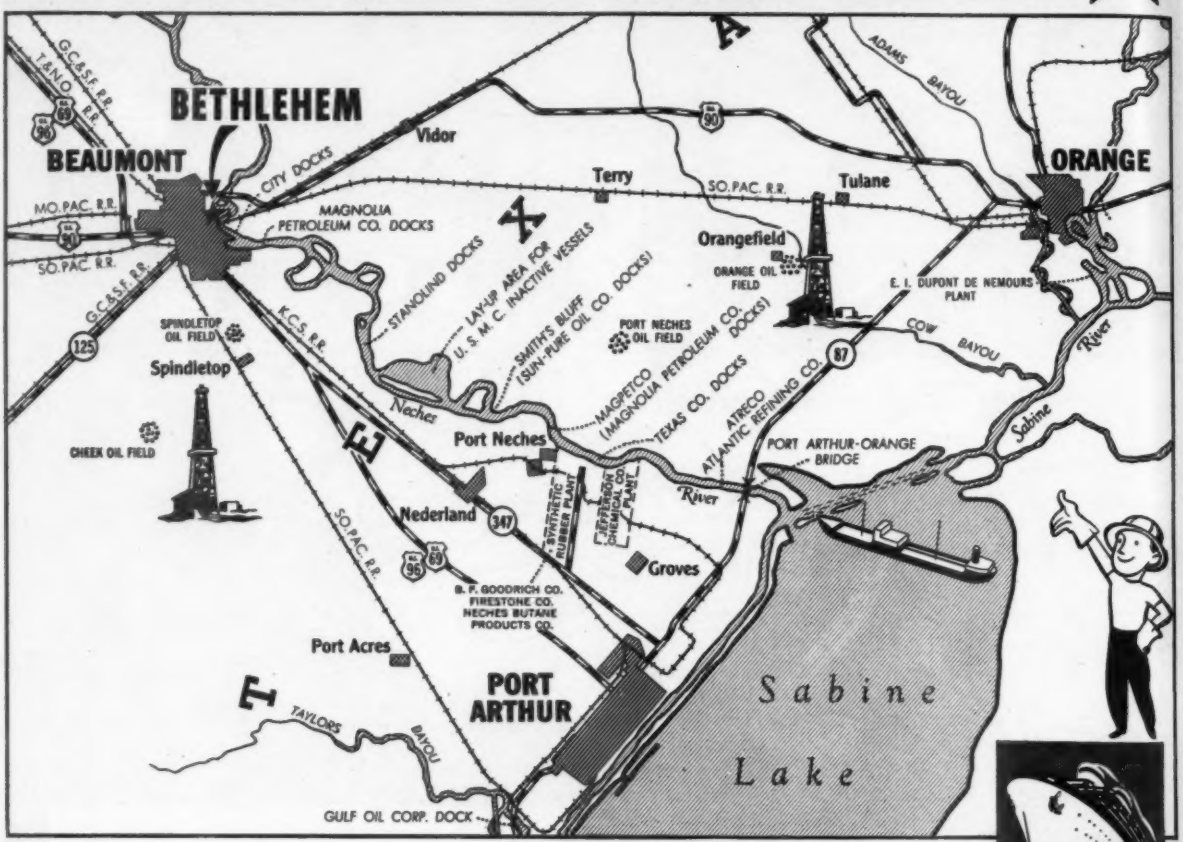

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Resistivity Change Through a Water Transition Zone

IT has been recognized for some time that there exists a correlation between the water saturation of a porous medium and its resistance to flow of electrical current, because of the fact that the majority of the current is conducted by the water content.[1] It has also been demonstrated that there exists a definite variation of water saturation with height above a free water table in a reservoir.[2] Consequently, there should be a correlation between height in the reservoir (or depth measured from the surface) and the resistivity measurements in those cases where a free water table exists. Tixier[3] has demonstrated this in some detail.

The relationship between resistivity and saturation is usually:

$$\rho_o/\rho_w = S_w^{-m} \qquad (1)$$

or

$$\log \rho_o = \log \rho_w - m \log S_w$$

where

ρ_o = resistivity at partial water saturation
ρ_w = resistivity at full water saturation
S_w = fractional water saturation
m = exponent characteristic of the reservoir rock and the configuration of the water phase saturating the rock

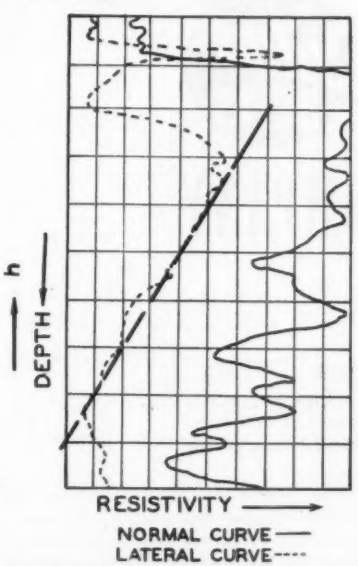

Fig. 1 — Example of linearity between depth and resistivity (Ref. 3).

It is common practice instead to rely upon a graphical expression of the relationship (capillary pressure versus water saturation). Assume that the analytical expression relating height and water saturation is also logarithmic. Thus:

$$\log h = \log a - b \log S_w \qquad (2)$$

where h is depth measured positively upward from a reference point, a, at which point S_w is equal to unity, and b is a constant of undetermined nature.

Combining Equations 1 and 2 to eliminate water saturation gives:

$$\log h = \log a - b \frac{(\log \rho_w - \log \rho_o)}{m}$$

which is a straight-line relationship between depth and resistivity on log-log paper if the constants in the equation are combined, thus:

$$\log h = (\log a - b/m \log \rho_w) + b/m \rho_o \qquad (3)$$

This states that the resistivity becomes smaller as h becomes smaller, or as the well depth increases. Physically, the value of ρ_o should be constant where the value of water saturation is constant and should vary where the value of water saturation varies. Hence, this variation of Equation 3 should be primarily through the water transition zone.

A further examination of Equation 3 shows that if b were equal to m the relationship would be linear on coordinate paper, thus:

$$h = a \rho_o/\rho_w \qquad (4)$$

It has been shown from experience that sometimes on a resistivity log through the water transition zone the resistivity does vary linearly with depth as demanded by Equation 4. Fig. 1 is an illustration of this, taken from Reference 3. It is to be noted that the slope of the linear relationship should be a/ρ_w. If ρ_w is known the value of a can be calculated. This is the base of the transition zone. If Equation 4 were universally valid it would also be useful in permitting the use of the resistivity log for basic capillary data on the reservoir (the quantity h/a).

The question to be answered now concerns the validity of the assumptions made in order to arrive at Equation 4. The original assumption (Equation 2) demands that capillary pressure, which is proportional to h, plot as a straight line on logarithm paper versus water saturation. This is not found to be the case for capillary-pressure curves in general, but it does hold for some curves, at least over the transition range. The assumption that the slope, b, of such a curve would be the same as the value of m in Equation 1 has at this point only the support that both the capillary pressure and resistance values depend upon configuration of water phase within porous system.

Equation 4 has been verified in a modified form in some few laboratory experiments where it has been found that capillary pressure and resistivity have a linear relationship although the relationship does not necessarily pass through the origin; one such relationship, Fig. 2, is from Reference 4.

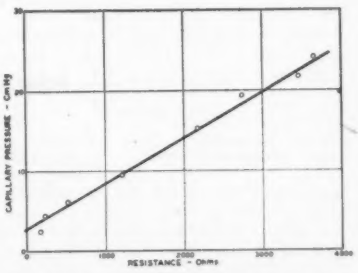

Fig. 2 — Linear variation of P_c and ρ_o (Ref. 4).

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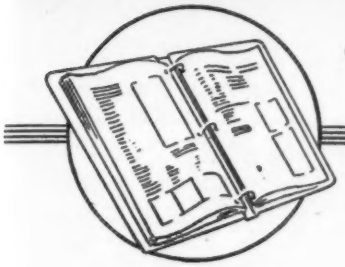

THE REFINER'S notebook

Rate Action

AS noted previously most refinery process-control applications involve the use of proportional mode alone or the combination proportional-reset mode. However, process conditions may be such as to warrant the use of other mode combinations. When a process has large lags and dead time but load changes are moderate, a proportional-plus rate controller may be used. A proportional-reset-rate ("derivative") controller may be employed if, in addition to abnormal lag and dead time, large variations in load take place. The three-function instrument may have a fixed rate time or two of the adjustments may be synchronized, but a third separate adjustment for rate time may be provided in order to obtain increased flexibility.

Control modes compared.—Effect of a sustained change in process load, resulting in controlled variable deviation, is shown in Fig. 1. The top curve is the pen record. Corresponding valve positions obtained with proportional-position, proportional-speed floating, and rate action, each operating alone, are indicated by the next three curves. The overlapping curves at the bottom represent valve positions obtained with combinations of individual modes. To understand the meaning of rate action (and its effect when combined with other modes) comparison of control actions is made as follows: (1) Proportional-position.—Valve movement is proportional to change or deviation of controlled variable. (2) Proportional-speed floating.—**Rate of valve movement** is proportional to change of controlled variable. (3) Rate or derivative.—Valve movement is proportional to **rate of change of controlled variable.** Operating alone this mode results in a continuous linear relation between rate of change of the controlled variable and position of the control valve. The control valve will open in proportion to the speed with which the temperature changes.

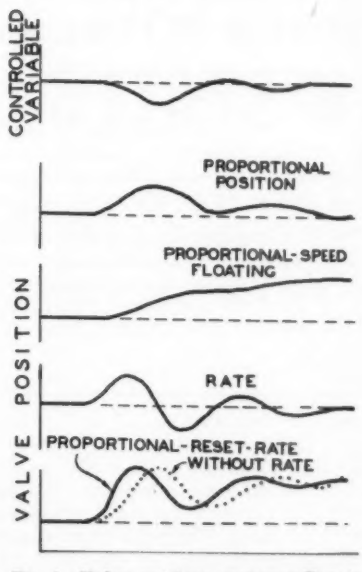

Fig. 1—Valve positions corresponding to values of the controlled variable as obtained with different control modes. Effect of adding the rate function is indicated by the solid curve at the bottom.

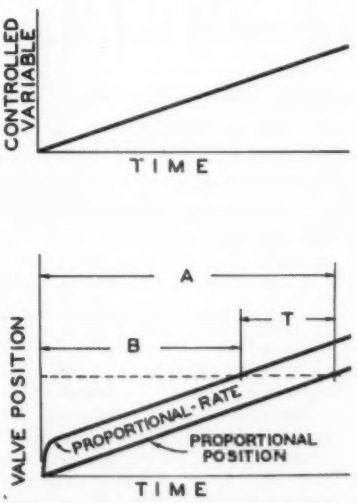

Fig. 2—Definition of rate time for a proportional-rate controller. Rate time = T = A — B. (From A.S.M.E. Glossary. References 1 and 2.)

Proportional-reset-rate.—Addition of the rate or derivative function (also known as preact or preset) to the other two functions results in anticipatory action of the controller by which there is a change in the valve opening before the temperature has reached the maximum deviation from the set point. The valve movement is said to "lead" the temperature change as is apparent from examination of Fig. 1. Note that rate action operating by itself results in offset, but when combined with proportional-reset action will result in faster return of temperature to the set point value. The control valve is opened more rapidly and in greater amount when rate action is added, taking a new position corresponding to change in process load. The response curve obtained depends on the controlled variable deviation and the settings of throttling range, reset rate and rate time.

Rate time.—The meaning of rate time in a proportional-rate controller is illustrated in Fig. 2. Rate time (usually expressed in minutes) is the time interval by which the control valve is made to anticipate, "lead," or advance the effect of proportional-position action through the rate action. Rate time is the "time required for a selected motion of the final control element due to the effect of proportional-position action alone, minus the time required for the same motion due to the effect of the combined proportional and rate actions which start at the same instant, upon deviation of the controlled variable."

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No. 36 in current series. The Refiner's Notebook has been published continuously since 1944.

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Approval has been granted refiners marketing in the northern states to increase the maximum vapor pressure in their gasoline from 13.5 to 15 lbs. R.V.P. This action was taken by the American Society for Testing Materials Committee D-2 (Petroleum Products) at its recent annual meeting in Atlantic City, N. J. Revision of its specifications D-439-49T by A.S.T.M. Committee provides that the Reid vapor pressure may be raised 1.5 lbs. in the following states:

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Iowa	North Dakota
Maine	South Dakota
Michigan	Vermont
Minnesota	Wisconsin
Montana	Wyoming

Section 2

Colorado	Indiana	Nebraska	Pennsylvania
Connecticut	Kansas	Nevada	Rhode Island
Delaware	Kentucky	New Jersey	Utah
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NATURAL GAS

Winter Gas Crisis Pends

WASHINGTON.—Never has so much attention been fixed on the natural gas supply as during the present season when winter demands have multiplied beyond all previous estimates, and questions have arisen in many areas whether present transmission facilities can be expected to fulfill the requirements that may be placed upon them.

Conversions to natural gas as a source of fuel have been so extensive that informed sources are apprehensive whether present pipe lines can meet the unprecedented demand which the peak winter season will load on the transmission facilities.

A review of the capacity offered by present systems does not include the vast amount of new installation that has matured during the present year. At the close of 1949, the largest mileage of pipe lines was that of United Gas Corp., having 6,743 miles then serving the consumer public. Next was Cities Service Co. with 4,406 miles. Panhandle Eastern Co. had 4,246 miles; Northern Natural Gas Co. had 3,601 miles; and El Paso Natural Gas Co. had 3,601 miles.

With its larger mileage, United also had the greatest daily capacity, a flow of 2,442,000 cu. ft. At the opening of the year, Cities Service had 792,000 cu. ft. daily capacity; Tennessee Gas Transmission Co. had 710,000 cu. ft.

In its compressor facilities, Texas Eastern led with 278,150 hp., followed by El Paso with 245,000 hp., and Tennessee Gas with 241,600 hp.

Tennessee Gas had the most mileage of pipe of 20 in. or more, beginning the year with 2,578 miles. Panhandle Eastern had 2,377 miles; Texoma Natural Gas Co. 1,890 miles.

Active construction now in progress will provide a substantial increase in facilities before the challenge of the unprecedented winter demand arrives.

Develop All-Year Plan

Fuller use of its transmission lines throughout the year is sought by Texas Gas Transmission Corp. in four major projects that are now incorporated in its construction program. The improved facilities are designed to reduce the variation between peak and slow seasons.

By installing a 9,960-hp. compressor at the Lebanon, Ohio, terminus, pipeline capacity will be increased by 60,000,000 cu. ft. of natural gas daily. Estimated cost of the compressor is $2,108,887.

Near Greenville, Miss., two new 20-in. pipe lines will be laid beneath the Mississippi River. This construction is estimated to cost $1,460,000.

Additional distribution lines will be laid to supply natural gas for a new steam-electric generating plant built by Arkansas Power & Light Co. near Forest City, Ark. The cost estimate is $801,600.

Further developments include new facilities for supplying Columbia Gas System with an additional 5,000,000 cu. ft. of natural gas daily. Texas Gas also plans to provide Spencer Chemical Co.'s new Henderson, Ky., plant with natural gas requirements, but contracts for the latter are still being negotiated.

Five Gas Lines Grouped

WASHINGTON.—Merger of its five subsidiaries into one corporation is planned by National Fuel Gas Co., to integrate the activities and effect economies in management and operation.

Application has been made to the Federal Power Commission for authority to effect the combination which would be known as United Natural Gas Co.

The companies to be affected by the merger are Ridgway Natural Gas Co., St. Mary's Natural Gas Co., Smethport Natural Gas Co., Mercer County Gas Co., and United Natural Gas Co., the last being the name used for the merged group.

Greater Southern Market

WASHINGTON.—Surveying larger natural-gas markets in Georgia and Florida than first outlined, South Georgia Natural Gas Co., Atlanta, Ga., has amended its application with the Federal Power Commission regarding its proposed pipe line.

Originally the project was estimated to cost $6,600,000, but the potential extension of markets has increased the estimate to $10,500,000 if the natural-gas requirements are supplied in full by Southern Natural Gas Co.; and $12,080,000 if production comes from Transcontinental Gas Pipe Line Corp.

South Georgia proposes to build a 526.9-mile pipe-line system extending from a connection with Southern Natural's system in northern Georgia and running into Florida. If the proposed system is connected with Transcontinental's line, the construction of an additional 53 miles of line will be required.

The project would make natural gas available to communities having a total population of approximately 234,000 potential consumers. In Georgia the towns are Adel, Albany, Americus, Ashburn, Bainbridge, Butler, Cairo, Camilla, Cordele, Dawson, Ellaville, Fitsgerald, Leesburg, Montezuma, Moultrie, Nashville, Ocilla, Oglethorpe, Pelham, Quitman, Sylvester, Thomasville, Tifton, Valdosta, and Vienna. The Florida communities are Havana, Quincy, and Tallahassee.

Additional studies are being conducted into the feasibility of constructing additional lines into other areas of southwest Georgia and southeast Alabama.

Ohio Winter Gas Flow

WASHINGTON.—Winter natural gas to warm eastern Ohio is to be provided by connecting pipe lines which two affiliates of Consolidated Natural Gas Co. will construct at a cost of $3,833,746. The proposed facilities will make available the aggregate winter delivery of approximately 3,600,000,000 cu. ft. of natural gas yearly.

Temporary authorization was granted by the Federal Power Commission to New York State Natural Gas Corp., New York, and East Ohio Gas Co., Cleveland, to install the needed facilities in Pennsylvania and Ohio.

New York State Natural will build a 62-mile, 20-in. line in Pennsylvania, and East Ohio will construct a 1-mile 20-in. line in Ohio. Approximately 40,000,000 cu. ft. of natural gas will be made available daily during the three winter months of peak demand.

Space Heating Emergency

WASHINGTON.—Space heating has created an unprecedented demand for natural gas in the Michigan area, making it necessary for Michigan Gas Storage Co., Jackson, Mich., to increase the capacity of its transmission system.

The company has asked the Federal Power Commission for authority to install two 2,200-hp. compressor units at an existing compressor station on its natural-gas transmission system. The estimated cost of construction is $765,000.

The requested units would enable Michigan Gas to meet the additional volume of gas required to supply Consumers Power Co., Jackson, for the great increase in the winter demand. Last winter the actual peak-day requirements were 145,418,000 cu. ft. of natural gas. The estimated requirements for the 1950-51 winter are 250,000,000 cu. ft. daily. Michigan Gas must be prepared to supply 233,000,000 cu. ft. if the Michigan consumers are to be served.

The abrupt and acute increase in the demand for natural gas is due to the great expansion in its use for space heating, and the lag between present supply and demand has reached the proportions of an "emergency."

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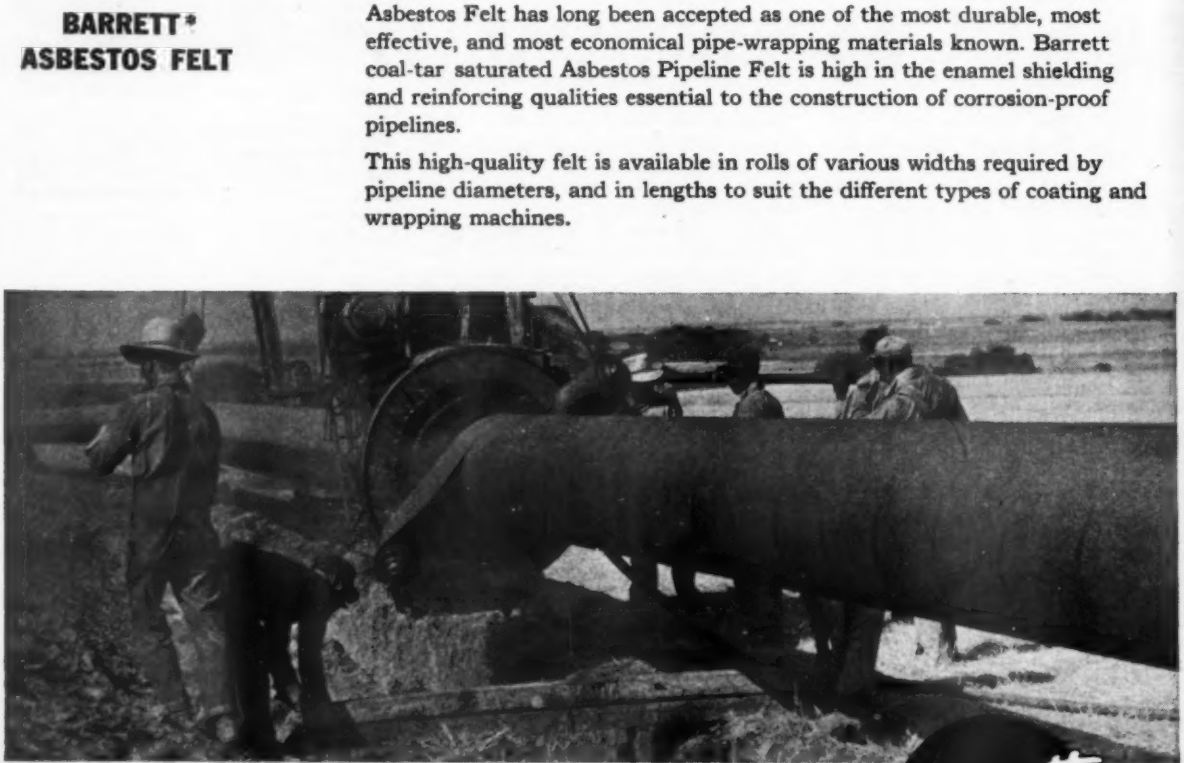

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PIPE LINES

Humble Increasing Capacity

HOUSTON.—Humble Oil & Refining Co. will increase capacity of its new $14,500,000 West Texas-Houston crude-oil pipe line by 20,000 bbl. daily, to a total of 104,000 bbl.

A pumping station at Eckert, 14 miles north of Fredericksburg, will be completed about October 1, the company reported, which will boost throughput of the 370-mile, 14-in. line from 84,000 to 104,000 bbl. daily. Two other intermediate stations, located near Fort McKavett, Tex., and Warda, Tex., will be completed later this year.

When all three stations are in operation, the line will be capable of moving from 120,000 to 125,000 bbl. of crude daily.

Eventually, another 400-hp. pumping unit will be added at each of the new stations, which will push total capacity of the line to 135,000 bbl. daily, Humble reported.

Humble's line was opened 2 months ago, and runs from Kemper Station, near Big Lake, 75 miles west of San Angelo, to Satusuma, near Houston.

Humble Pipe Line Co. is now in the process of completing an extension of facilities which will provide a pipe-line outlet to the Fort Chadbourne area in the northwest portion of Runnels County, Texas.

An 8-in. main line will be extended from the Ballinger station 32 miles northwest to the Odom station at the field end of the line, which is located in the southern Fort Chadbourne area. A field gathering system will collect the oil at the Odom station where it will be pumped to the Ballinger station, and thence to refineries or other outlets.

The new line will also provide outlets for intermediate producing areas between Fort Chadbourne and Ballinger. These connections will be completed as quickly as working conditions and availability of pipe will permit. Prior to the building of this new line, the area had no pipe-line outlet.

Initially, portable-type equipment will be used at the Odom station to provide for a maximum movement of 10,000 bbl. of oil per day from the Fort Chadbourne area. The new line will have adequate capacity to handle forecasted production in the area.

Alberta Completion Nears

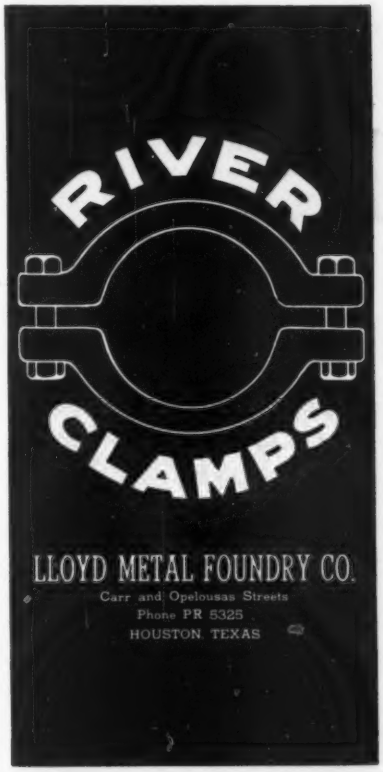
Interprovincial Pipe Line Co. is nearing completion on the construction of the 450-mile Edmonton-Regina section of its Alberta-Great Lakes crude-oil pipe line.

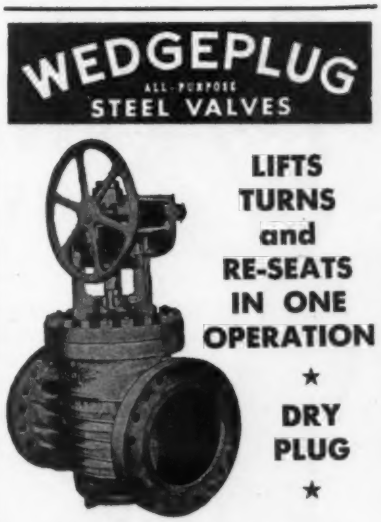
Up to last week, according to a report by the company, 368 miles of the Edmonton-Regina section had been ditched and 324 miles welded. In the previous 2 weeks, some 50 miles was covered by the crews.

Interprovincial's schedule calls for completion of this section this year. The 450 miles of 20-in. will have an initial capacity of 95,000 bbl. daily. Some crude is now moving into the completed section of the line. Alberta production in the week ended August 21 set a new record with an average of 86,340 bbl. daily.

Work on the two other sections of the total 1,150-mile Interprovincial line is moving forward. On the 340-mile, 16-in. section from Regina to Gretna, Man., 269 miles has been ditched, and 267 miles welded. A total of 27 miles was ditched in the pre-

SYMBOLIC PLOW.—The old prairie-breaking walking plow, made virtually obsolete by the petroleum industry, was used in the ceremony breaking ground for the 1,300-mile gas line of Texas-Illinois Natural Gas Pipe Line Co. at Hungerford, Tex., last week while trucks loaded with 40-ft. lengths of 30-in. pipe stand as though ready to charge behind the plow all the way from the Gulf Coast to Chicago. The digging actually will be done by the improved type of ditcher standing in the background.

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vious 2 weeks. In the 360-mile, 18-in. section from Gretna to Superior, Wis., 176 miles has been ditched, and 182 miles welded. These sections are to be finished next spring.

Laterals are Planned

HUNGERFORD, Tex.—Texas Illinois Natural Gas Pipeline Co. will construct 37 miles of 12-in. and 35 miles of 24-in. laterals from Phillips Petroleum Co.'s properties at Chocolate Bayou field in Brazoria County, Texas, in connection with its 30-in. line from Texas to Joliet, Ill., it was disclosed at groundbreaking ceremonies here recently. The laterals will tie in with Compressor Station 301 at Wharton.

Another 26-in. lateral is to be built by outside interests to Texas Illinois' main line from the Old Ocean field, and a 24-in. lateral from other outside interests is planned from the LaGloria field.

Design, engineering, and right-of-way work for Texas Illinois' laterals will be handled by Fish Pipeline Construction Co., Houston.

Initial capacity of the main line will be 305,000,000 cu. ft. daily, which will ultimately be increased to 525,000,000 cu. ft. daily by adding more compressor stations.

Outlet Planned by Frontier

DENVER.—A crude-oil line is being planned by Frontier Refining Co. which will connect the Maudlin Gulch field of Colorado with Service Pipe Line Co.'s system.

The proposed line will run from the field to Iles station, where it will tie into Service's 6-in. line, which runs to Craig, in Moffat County.

Columbia Units Expand

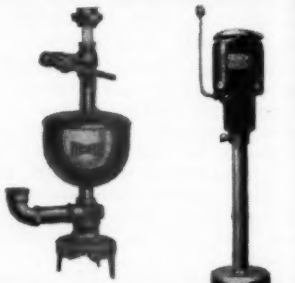
New facilities costing $1,445,070 will be constructed by four subsidiaries of Columbia Gas System, Inc., to make additions to their natural-gas transmission systems in Ohio, West Virginia, Pennsylvania, and New York.

The Federal Power Commission has granted authorization to Manufacturers Light & Heat Co., Cumberland, and Allegheny Gas Co., Natural Gas Co. of West Virginia, and Home Gas Co., all of Pittsburgh.

Home is the only company planning to extend its gas service to new communities, having arranged with Rockland Gas Co. for resale in Ramapo, Tuxedo, Tuxedo Park, and Sloatsburg, all in New York.

Manufacturers will construct approximately 48 miles of pipe line ranging from 4 to 16-in. at various points through Ohio, Pennsylvania, and West Virginia. Two additional compressor units and dehydration equipment will be added in existing stations. In addition, Manufacturers

PENBERTHY SUMP PUMPS



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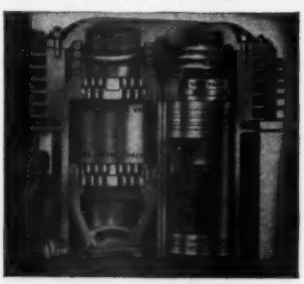

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plans to retire a short line and some compressor units in Pennsylvania. Estimated cost is $1,307,970.

Natural Gas will build 4.5 miles of 4, 6, and 8-in. pipe line in Ohio, the estimated cost being $110,400.

Enlarge Pipe Lines

WASHINGTON.—Expansion of its present capacity to 146,000,000 cu. ft. of natural gas daily through additional pipe lines has been authorized for Kansas-Nebraska Natural Gas Co., Phillipsburg, Kans.

The new facilities will be used to introduce service into Pleasanton, Nebr., and to meet increased demands of present markets. Estimated cost of the project is $729,331.

The construction program includes installation of 1,640 hp. additional capacity at compressor stations in Kansas and Nebraska; 16 miles of 12¾-in. line to replace smaller line in Kansas; approximately 6 miles of 12¾-in. line to loop an existing installation; 22 miles of 8⅝-in. line in Nebraska; 6 miles of 8⅝-in. line and 2.6 miles of 6⅝-in. line in Kansas; and approximately 4 miles of 2⅜-in. pipe in Nebraska.

Indiana Towns Seek Gas

Twelve communities in northeastern Indiana will become consumers of natural gas through a 31-mile pipeline installation proposed by Northern Indiana Fuel & Light Co., Auburn, Ind. Supply of natural gas for Northern's proposed facilities will come from Panhandle Eastern Pipe Line Co.

Authority for the extension is sought from the Federal Power Commission, the application estimating a maximum daily demand for 500,000 cu. ft. of natural gas during the winter of 1950-51. Estimated cost of the 8⅝-in. line is $511,315. Necessary arrangements for the financing have been made by Northern, plus additional funds required to convert its distribution system to natural gas.

Communities to be serviced are Auburn, Garrett, Altoona, Kendallville, Woodburn, Harlan, Grabill, Lee, Spencerville, St. Joe, and Waterloo.

Pipe Line Sale

Independent Natural Gas Co., Pampa, Tex., has asked federal approval to sell its 21-mile pipe line and compressor station in Gray County to Northern Natural Gas Co., Omaha, Neb. The pipe line connects with Northern's facilities in Carson County, Texas.

Exclusive use of the facilities has been to supply natural gas to Northern, and the proposed transaction would not involve any termination of service. Northern has offered $229,200 for the facilities.

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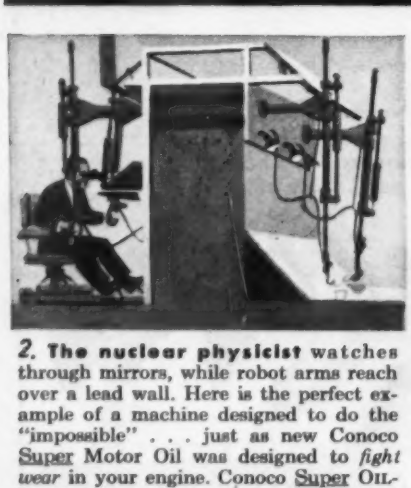

2. **The nuclear physicist** watches through mirrors, while robot arms reach over a lead wall. Here is the perfect example of a machine designed to do the "impossible" . . . just as new Conoco Super Motor Oil was designed to *fight wear* in your engine. Conoco Super OIL-PLATES your engine, to make it last longer, use less gasoline and oil.

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Pipe-Line Construction

FOLLOWING is a tabulation of pipeline projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Gulf Refining Co., Tulsa Pipe Line Division.—72 miles, 6-in., under way, El Dorado, Kans., to Webb City, Okla.; Pipeline Service Co., contractor. J. W. Welcher, Atlanta, Kans., spreadman.

Lakehead Pipe Line Co., Inc. (American subsidiary of Interprovincial Pipe Line Co., Canada).—321 miles, 18-in., contracted Neche, N. D., to Superior, Wis., to be completed October 1950; Anderson Bros., contractor.

Pan American Pipe Line Co.—80 miles, 10-in., under way, from southern part of Scurry County, Texas, to a connection with Humble pipe line near San Angelo, Tex.; Brown & Root, contractor.

Pelican Oil Co.—60 miles, 6-in., under way, Lake Charles to DeQuincy, La.

Phillips Pipe Line Co.—50 miles, 6-8-in., under way, Phillips tank farm, Sweeny, Tex., to Humble's Webster Station, Galveston County, Texas; O. R. Burden Construction Co., contractor; B. C. Barney Hall, spreadman.

Phillips Pipe Line Co.—25 miles, 8-in., considered, loops between Thrall and Kansas City, Kans.

Platte Pipe Line Co.—1,080 miles, 16-20-in., planned, Worland, Wyo., to Wood River refining area in Illinois.

Platte Pipe Line Co.—940 miles, 20-in., planned, Casper to Wood River.

Platte Pipe Line Co.—140 miles, 16-in., planned, Worland to Casper, Wyo.

Portland Pipe Line Co. (Montreal Pipe Line Co., Ltd.).—236 miles, 18-in., contracted, Portland, Me., to Montreal, Que., Canada.

Portland Pipe Line Co. (Montreal Pipe Line Co., Ltd.).—85 miles, 18-in., under way, Portland, Me., to Gorham, N. H.; Oklahoma Contracting Co., contractor of Section 1; H. A. Waylie, Westbrook, Me., superintendent.

Portland Pipe Line Co. (Montreal Pipe (Canada).—321 miles, 18-in., contracted, Gorham, N. H., to international boundary near N. Troy, Vt.; Associated Pipeline Contractors, Inc., contractor of Section 2. Lacy Walker, Barton, Vt., spreadman.

Portland Pipe Line Co. (Montreal Pipe Line Co.).—68 miles, 18-in., contracted, Canadian boundary to Montreal; Fred Mannix, contractor of Section 3.

Service Pipe Line Co.—25 miles, 8-in., under way, Beaver Creek and Riverton, Wyo.; Vaughn & Taylor Construction Co.

Shell Pipe Line Corp.—39 miles, 10-in., under way, McCamey to Kemper, Tex.; McVean & Roberts, contractor.

Socony-Vacuum Oil Co., Inc. (White Eagle Division).—122 miles, 8-in., considered, Big Horn basin to Casper, Wyo.

Texas-New Mexico Pipe Line Co.—16½ miles, 10-in., under way, Scurry County, Texas; O. R. Burden, contractor, Bill Price, spreadman.

West Coast Pipe Line Co.—20-in., planned, Permian basin, West Texas, to California.

Products Pipe Lines

Great Lakes Pipe Line Co.—39 miles, 12-in., under way, Hawarden, Iowa, to Sioux Falls, S. D.; Midwestern Constructors, Inc., contractor, R. C. Stanley, Canton, S. D.

Great Lakes Pipe Line Co.—355 miles, 12-in., authorized, Kansas City through Omaha and Sioux City, Iowa, to Sioux Falls, S. D.

Phillips Petroleum Co.—281 miles, 10-in., proposed, Borger, Tex., to Yale, Okla.

Phillips Petroleum Co. and Shamrock Oil & Gas Co.—155 miles, 6-in., planned, extension on 600-mile line at Phillips, Tex., via La Junta, to Denver.

Pure Transportation Co.—100 miles, 6-in., proposed, Heath to Dayton, Ohio.

Salt Lake Pipe Line Co.—242 miles, 6-8-in., under way, Boise, Idaho, to Pasco, Wash. Completion date, December 1950.

Salt Lake Pipe Line Co.—140 miles, 8-in., contracted Boise, to Baker, Idaho; Bechtel Corp., contractor.

Salt Lake Pipe Line Co.—Contracted, Macco Corp., and Morrison-Knudson Co., Inc.

Salt Lake Pipe Line Co.—120 miles, 6-8-in., under way, Baker, Ore., to Pasco, Wash. Completed August 8, 1950; Pacific Pipeline & Engineers, Ltd., contractor, L. E. Robertson, LaGrande, Ore., spreadman.

Standard Oil Co. (Ohio) and Shell Oil Co.—56 miles, 8-in., under way, Lima to Springfield, Ohio; Tulsa Construction Co., contractor.

Susquehanna Pipe Line Co.—126 miles, 8⅝-in., under way, Toledo, Ohio, to Sarnia, Ont., Canada; H. L. Gentry Construction Co., contractor. James Mitchell, Toledo, Ohio, spreadman.

Natural-Gas Pipe Lines

Acme Natural Gas Co.—25½ miles, 6-10-in., contracted, Ellwood to Butler, Pa., to be completed December 1, 1950; Williams-Austin Co., contractor. Leman Creech, Zelienople, Pa., spreadman.

Alabama-Tennessee Natural Gas Co.—35 miles, 8-in., authorized, Muscle Shoals to Decatur, Ala.

Algonquin Gas Transmission Co.—276 miles, proposed, Lambertville, N. J., to Boston area.

Algonquin Gas Transmission Co.—492 miles, proposed, laterals, New England area.

Atlantic Gulf Gas Co. (United Gas Pipe Line Co.).—1,530 miles, planned, Alabama-Florida-Georgia-South Carolina.

Central Kentucky Natural Gas Co.—42 miles, 20-in., under way, North Means compressor station to Foster, Ky; completion date December 1, 1950; Williams-Austin Co., contractor, Howard Bauer, Mt. Sterling, Ky., spreadman.

Chicago District Pipe Line Co.—41 miles, 24-in., authorized, loop Calumet pipe line—Joliet, Ill., to Chicago, completion date December 1950.

City of Indianapolis, Inc.—55 miles, 16-in., proposed, Indianapolis to Texas Eastern Transmission Corp. system.

Coast Counties Gas & Electric Co.—40 miles, 3-4-8-in., considered, coast and valley region, California.

Coastal Pipe Line Co.—1,000 miles, planned, Texas to Norfolk, Va.

Commonwealth Natural Gas Corp.—84 miles, 12-in., contracted, Richmond to Newport News, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Co.—20 miles, 8-in., contracted, James River to Newport News, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Co.—10 miles, contracted, laterals, Richmond, Suffolk, and Portsmouth, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp.—104 miles, 18-in., under way, Standardsville to near Petersburg, Va.; Ray L. Smith & Son, contractor, Don C. Smith, Orange, Va., spreadman.

Commonwealth Natural Gas Corp.—537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

Consolidated Gas Utilities Corp.—41 miles, 12-in., planned, Enid to Blackwell, Okla., Marlow to Cement, Okla.

East Ohio Gas Co.—24 miles, 20-in., authorized, northeastern Ohio to near Petersburg to East Ohio's Austintown station near Youngstown.

East Tennessee Natural Gas Co.—100 miles, planned, lateral to be laid in 1950.

East Tennessee Gas Corp.—150 miles, 16-

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in., under way, Knoxville to Bristol, Tenn.

East Tennessee Natural Gas Co.—398 miles, 3-16-in., planned, Nashville to Chattanooga to Knoxville, Tenn., and laterals.

East Tennessee Natural Gas Co.—106 miles, 12-16-in., contracted, Lobelville to Tullahoma, Tenn.; Oman Construction Co., contractor.

East Tennessee Natural Gas Co.—130 miles, 12-in., under way, Athens, via Chattanooga, to Tullahoma, Tenn.; N. A. Saigh Co., Inc.

East Tennessee Natural Gas Co.—120 miles, 12-in., planned, Chattanooga to Knoxville, Tenn.; Walters & Saigh Construction Co.

East Tennessee Natural Gas Co.—185 miles, 16-in., planned, Lobelville to Chattanooga, Tenn., Walters & Saigh Construction Co.

Eastern Natural Gas Corp.—292 miles, 24-in., proposed, Phoenixville, Pa., via New Haven and Hartford, Conn., Providence, R. I., Springfield, Mass., and Boston.

Egyptian Natural Gas Co.—80 miles, 6-8-in., planned, Norris City to Salem-Centralia, Ill., area.

El Paso Natural Gas Co.—352 miles, 30-in., under way, looping of 26-in., New Mexico-California line and connection with Pacific Gas & Electric Co. at Needles, Calif., to be completed November 1950.

El Paso Natural Gas Co.—450 miles, 24-in., authorized, San Juan basin, New Mexico, to Franconia, Ariz., to be completed November 1951 by company crews.

Home Gas Co.—70 miles, planned, Orange, Sullivan, Rockland, and Cattaraugus counties, New York.

Jersey Central Power & Light Co.—39 miles, 10-in., planned, New Jersey coast system of Texas Eastern Transmission Co.'s Big Inch.

Magnolia Petroleum Co.—60 miles, 4-24-in., gathering system in LaWard and Lolita fields, Texas; Henry L. Lemons & Co., contractor. W. A. Remington, spreadman.

Michigan Gas Storage Co.—150 miles, 20-in., planned, Chelsea terminal-Winterfield and Cranberry Lake, Mich.; Mahoney Contracting Co., contractor.

Michigan-Wisconsin Pipe Line Co.—197 miles, 6-18-in., under way, Milwaukee to Green Bay and Two Rivers, Wis.; G. G. Griffis Construction Co., contractor. F. K. Egan, Fond du Lac, Wis.

Mississippi River Fuel Corp.—40 miles, 18-in., authorized, Dubach to Perryville, La.

Montana-Dakota Utilities Co. and Montana-Wyoming Gas Pipe Line Co.—335 miles, 12¾-in., under way, Worland, Wyo., to Baker, Mont.; R. A. Conyes Construction Corp., contractor. Al Poggi, Hardin, Mont., superintendent.

New York State Natural Gas Corp.—21 miles, 20-in., under way, Tonkin station to Bakerstown, Pa., to be completed December 1, 1950; Williams-Austin Co., contractor. Ralph Gaddy, New Kensington, Pa., spreadman.

New York State Natural.—164 miles, 16-in., planned, Ithaca to Albany, N. Y.

New York State Natural Gas Corp.—70 miles, 20-in., planned, North Oakford, Pa., to Ohio state line.

Niagara Mohawk Power Corp.—35½ miles, 10-14-in., under way, Therm station, to Fulton, N. Y.; Williams-Austin Co., contractor. Howard Bauer, Nedrow, N. Y., spreadman.

Northeastern Gas Transmission Co.—511 miles, up to 20-in., proposed, to extend from a connection with a proposed Tennessee Gas Transmission Co. extension to serve New England states.

Northern Natural Gas Co.—597 miles, 20-26-in., contracted, ten loops from Texas to northern Iowa.

Northern Natural Gas Co.—6 miles, 4 to 12-in., under way, gathering line in vicinity of Hugoton, Kans., Cheek Construction Co., contractor, Troy Cheek, Ulysses, Kans., superintendent.

Northern Natural Gas Co.—111 miles, 24-in., under way, Ogden, Iowa, to St. Paul, Minn.; R. B. Potashnick, contractor.

Northern Natural Gas Co.—75 miles, 26-in., under way, north of Beaver, Okla.; R. H.

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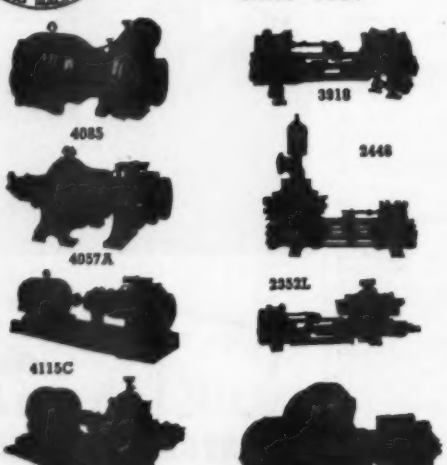

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Fulton & Co., contractor of Loop 2. Merele Lewellen, Mead, Kans., spreadman.

Northern Natural Gas Co.—33 miles, 26-in., contracted, Mullinville, Kans., station; R. H. Fulton & Co., contractor of Loop 3.

Northern Natural Gas Co.—72½ miles, 26-in., under way, Bushton to Minneapolis, Kans.; R. H. Fulton & Co., contractor of Loop 4. M. L. Boyd, Salina, Kans., spreadman.

Northern Natural Gas Co.—155 miles, 20-in., contracted, Garden City to Bushton, Kans.; R. H. Fulton & Co., contractor of Loop 5. Jerry Nash, Garden City, Kans., spreadman.

Northern Natural Gas Co.—43 miles, 26-in., under way, Palmyra, Neb., station to Oakland, Iowa, station; Midwestern Construction Co., Inc., contractor of Loop 6. R. C. Stanley, Glenwood, Iowa, spreadman.

Northern Natural Gas Co.—65 miles, 26-in., under way, northeastward from Oakland, Iowa, station; Midwestern Construction, Inc., contractor of Loop 7. Lyle S. DeWitt, Palmyra, Neb., and J. A. Bard, Beatrice, Neb., superintendent.

Northern Natural Gas Co.—31 miles, 26-in., under way, north of Ogden, Iowa; R. B. Potashnick Co., contractor of Loop 8. H. F. Carr, Ventura, Iowa, spreadman.

Northern Natural Gas Co.—41 miles, 26-in., contracted, northward from Ventura, Iowa, station; R. B. Potashnick Co., contractor of Loop 9.

Northern Natural Gas Co.—40 miles, 26-in., contracted, Ventura, Iowa, station; R. B. Potashnick, contractor of Loop 10.

Northern Natural Gas Co.—222 miles, 26-in., under way, Borger, Tex., to Nebraska line; R. H. Fulton & Co., contractor. M. C. Boyd, Ashland, Kans., spreadman.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

Ohio Fuel Gas Co.—22 miles, 16-in., authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

Pacific Gas & Electric Co.—47 miles, 8-in., authorized, Salinas to Kilig City, Calif.

Pacific Gas & Electric Co.—426 miles, 34-in., under way, Topock, Ariz., to Llanda, Calif.; Bechtel-Price-Conyes Corp., contractor. R. L. Bowman, general superintendent.

Pacific Lighting Corp.—23 miles, 30-in., planned, Inglewood to Encino, Calif.

Pacific Lighting Corp.—41 miles, 30-in., planned, Puente to March Field, California, to be completed 1950.

Pacific Northwest Pipe Line Co.—400 miles, 22-in., gathering lines on Texas Gulf Coast to Pacific Northwest pipe line.

Pacific Northwest Pipe Line Corp.—2,175 miles, 26-in., authorized, Texas Gulf Coast to Pacific Northwest.

Panhandle Eastern Pipe Line Co.—356 miles, 26-in., authorized, looping in Texas, Oklahoma, Kansas, Missouri, Illinois, Indiana, Ohio, and Michigan.

Phillips Petroleum Co.—118 miles, 3-22-in., under way, Sherman and Hansford counties, Texas, gas-gathering system; Vaughn & Taylor Construction Co., Inc., Texhoma, Okla.

Piedmont Natural Gas Co.—1,350 miles, 20-in., planned, Greenville, Miss., to Carolinas.

Plains Natural Gas Co.—200 miles, 4-24-in., contracted, Oklahoma-Kansas area, Hugoton field, gathering system; Midwestern Constructors, Inc., (Arey-Phillips Construction Co.) contractor. T. S. Nunley, Liberal, Kans., spreadman.

Potomac Gas Co.—18 miles, 16-in., planned, Dranesville to Arlington, Va.

Prince George's Gas Corp.—20 miles, 22-in., authorized between Chillum and Rockville, Md.

Roanoke Pipe Line Co.—30 miles, 8-in., authorized, Gala, Va., to Roanoke.

San Diego Gas & Electric Co.—53 miles, 16-in., planned, San Diego County, California.

San Diego Gas & Electric Corp. (Southern Counties Gas Co.)—85 miles, authorized, San Diego, Riverside, and Moreno, California.

South Central Alabama Natural Gas Co., Inc.—150 miles, proposed, central Alabama.

South Georgia Natural Gas Co.—248 miles, planned.

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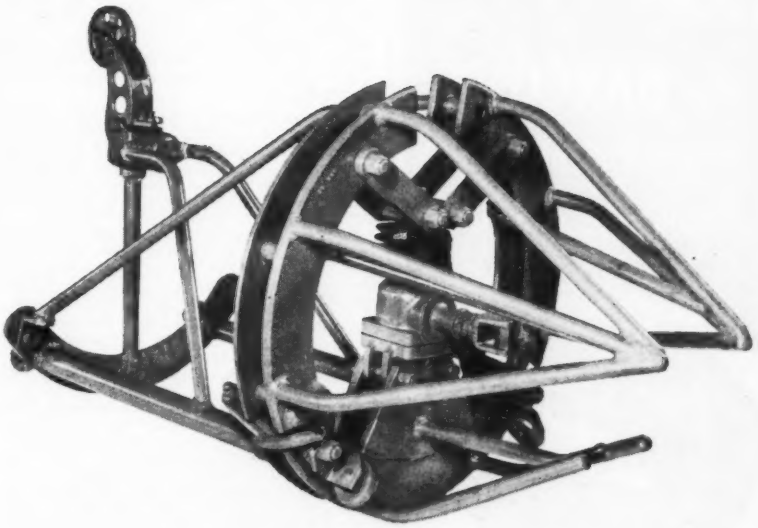

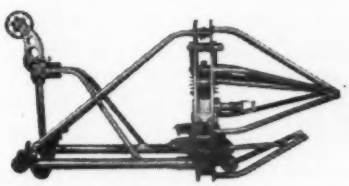

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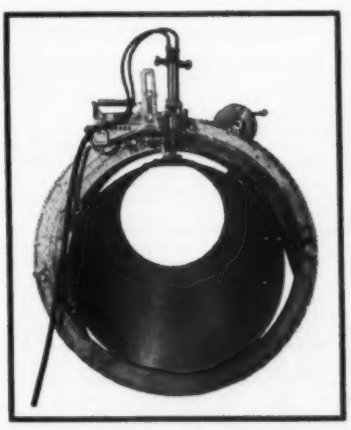

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South Jersey Gas Co.—75 miles, 10-12-14-in., under way, Pleasantville, N. J., to Bustleton, Pa.; G. G. Griffis, Inc., contractor, Ray Abney, Millville, N. J., spreadman.

South Jersey Gas Co.—14-in., under way, Franklinville to Bridgeton, N. J.; G. G. Griffis, Inc., contractor.

Southwestern Michigan Gas Co.—55 miles, 12¾-in., proposed, Oakland County to Marysville, Mich.

Southern California Gas Co.—83 miles, 30-in., under way, Whitewater, Riverside County, to Puente, Los Angeles County, California; Midwestern Constructors, joint contract with Johnson Western Gunite—L. E. Dixon. John Work, Banning, Calif., superintendent.

Southern Counties Gas Co. of California.—81 miles, 20-in., authorized, looping.

Southern Natural Gas Co.—32 miles, 16-in., under way, Wetumpka to Tallassee, Ala.; completion due November 1; Sheehan Pipe Line Construction Co., contractor, C. M. Brown, spreadman.

Southern Natural Gas Co.—180 miles, 18-in., under way, Gwinville, Miss., to Selma, Ala.; Sheehan Pipe Line Construction Co., contractor. Jim Brown, Meridian, Miss., spreadman.

Southern Natural Gas Co.—24 miles, 24-in., under way, loops to Mississippi, Alabama, Georgia; Sheehan Pipe Line Construction Co., contractor. Jim Brown, R. H. Brown, spreadmen.

Southern Natural Gas Co.—95 miles, 18-in., under way, Gwinville to Mississippi-Alabama state line; completion due November 1; Sheehan Pipe Line Construction Co., contractor. J. W. Brown, spreadman.

Southern Natural Gas Co.—85 miles, 18-in., under way, Mississippi-Alabama state line to Selma, Ala.; completion due November 1; Sheehan Pipe Line Co., contractor. C. M. Brown, spreadman.

Southern Natural Gas Co.—110 miles, 11-in., considered, extension.

Southern Natural Gas Co.—118 miles, 13-in., planned, extension.

Southern Natural Gas Co.—138 miles, 20-22-in., planned, Chattanooga, Tenn., to Lexington, Miss.

Southern Natural Gas Co.—171 miles, 16-planned, extension.

Southern Natural Gas Co.—225 miles, 16-in., planned, Colfax, Ga., extension.

Southern Natural Gas Co.—314 miles, 18-in., planned, extension.

Southern Natural Gas Co.—375 miles, 24-in., planned, Gwinville, Miss., to Atlanta, Ga.

Southern Union Gas Co.—78 miles, 8-10-14-in., planned, New Mexico loops and laterals.

Tennessee Gas Transmission Co.—105 miles, 16-in., under way, Bayou Sale to Kinder, La.; Latex Construction Co., contractor. H. L. Peake, superintendent.

Tennessee Gas Transmission Co.—63 miles, 26-in., under way, south bank of Mahoning River, near Youngstown, Ohio, and extending southwestward. H. C. Price, contractor. G. A. Reutzel, Columbiana, Ohio, superintendent.

Tennessee Gas Transmission Co.—63 miles, 26-in., under way, north bank of Muskingum River, and extending northeastward. H. C. Price Co., contractor. R. K. Shivel, Zanesville, Ohio, superintendent.

Tennessee Gas Transmission Co.—47 miles, 26-in., under way, south bank of Muskingum River, and extending southwestward, early fall; H. C. Price Co., contractor. W. B. Williams, McConnelsville, Ohio, superintendent.

Tennessee Gas Transmission Co.—47 miles, 26-in., under way, north bank of Ohio River, and extending northeastward. H. C. Price Co., contractor. C. R. Ice, Portsmouth, Ohio, superintendent.

Tennessee Gas Transmission Co.—700 miles, 20-26-in., planned, Burnaugh, Ky., to Massachusetts including 400-mile line to Buffalo.

Tennessee Gas Transmission Co.—95 miles, 20-in., under way, Natchitoches to Kinder, La.; Latex Construction Co., contractor. F. A. Silar, superintendent.

Tennessee Gas Transmission Co.—992 miles, 30-in., planned, first 150 miles of loops to be

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Tennessee Gas Transmission Co.—70 miles, 26-30 in., contracted, between Stations 104 and 110; Anderson Brothers Corp., contractor. E. C. McCoy and Arkie Hobson, Richmond, Ky., spreadmen.

Tennessee Gas Transmission Co.—174 miles, 30-in., under way, western Tennessee and Kentucky; Price-Morrison, contractor. Jack Hodges and R. L. McMillon, superintendents.

Tennessee Gas Transmission Co.—74 miles, 30-in., under way, from near Glasgow northeastward to near Lebanon, Ky; Morrison Construction Co., contractor. R. L. McMillon, Scottsville, Ky., spreadman.

Tennessee Gas Transmission Co.—28 miles, 30-in., under way, near Scottsville, southwestward to near White House, Tenn.; Morrison Construction Co., contractor. R. L. McMillon, Scottsville, Ky., spreadman.

Tennessee Gas Transmission Co.—99 miles, 30-in., under way, near Dickson, southwestward to near Selmer, Tenn.; H. C. Price, contractor. Jack Hodges, Dickson, Tenn., spreadman.

Tennessee Gas Transmission Co.—170 miles, 26-30-in., contracted, Kentucky; Anderson Brothers Corp., contractor.

Texas Eastern Transmission Corp.—1,400 miles, 26-in., planned, Texas to Pittsburgh, loops.

Texas Gas Transmission Corp.—33 miles, 12-in., authorized, Slaughters, Ky., to Evansville, Ind.

Texas Gas Transmission Corp.—723 miles, 26-in., under way, Lisbon, La., to Middletown, Ohio.

Texas-Illinois Natural Gas Pipeline Co.—58 miles, 20-in., lateral from Joliet terminal to connection with Natural Gas Pipeline Co. of America near Volo, Ill.

Texas-Illinois Natural Gas Pipeline Co.—1,300 miles, 30-in., approved, Corpus Christi area to Joliet, Ill.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 26-in., under way, La Gloria to Refugio, Tex.; Midwestern Constructors, Inc., contractor of Schedule 1.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 30-in., under way, Mississippi River to Effingham, Ill.; Midwestern Constructors, Inc., contractor of Schedule 11.

Texas-Illinois Natural Gas Pipeline Co.—117 miles, 30-in., to start in 1951, Effingham to Sibley, Ill.; Midwestern Constructors, Inc., contractor to Schedule 12.

Texas-Illinois Natural Gas Pipeline Co.—92 miles, 30-in., to start in 1951; Sibley to Joliet, Ill.; Midwestern Constructors, Inc., contractor of Schedule 13.

Texas-Illinois Gas Pipe Line Corp.—420 miles, 30-in., contracted, Arkansas and Missouri; Bechtel Corp.

Texas-Illinois Gas Pipe Line Corp.—126 miles, 30-in., contracted; H. C. Price, contractor.

Texas-Illinois Gas Pipe Line Corp.—113 miles, 30-in., contracted; H. C. Price, contractor.

Texas-Illinois Gas Pipe Line Corp.—97 miles, 26-in., contracted; H. C. Price, contractor.

Texas-Illinois Gas Pipe Line Corp.—36 miles, 24-in., contracted; H. C. Price, contractor.

Texas-Illinois Gas Pipe Line Corp.—38 miles, 12-in., contracted; H. C. Price, contractor.

Transcontinental Gas Pipe Line Corp.—1,840 miles, 30-in., under way, Rio Grande Valley, Texas, to New York City.

Transcontinental Gas Pipe Line Corp.—80 miles, 10-14-in., underway, Mercedes to south of Falfurrias, Tex.; Massey Construction Co., contractor of Schedule A.

Transcontinental Gas Pipe Line Corp.—108 miles, 24-in., under way, south af Falfurrias to Edna, Tex.; H. B. Zachry Co., contractor of Schedule B.

Transcontinental Gas Pipe Line Corp.—92 miles, 30-in., under way, Porters to Deweyville, Tex.; Texas Southern Contracting Co., contractor of Schedule D. Merle Tatum, Liberty, Tex., spreadman.

Transcontinental Gas Pipe Line Corp.—81 miles, 30-in., under way, Sabine River, to Eunice, La.; Anderson Bros. Corp., contractor of Schedule E.

Transcontinental Gas Pipe Line Corp.—100 miles, 30-in., under way, Catawba River, North Carolina, to North Carolina-Virginia boundary; R. H. Fulton & Co., contractor of Section 9. A. A. Corrigan and Clark Williams, superintendents.

Transcontinental Gas Pipe Line Corp.—86 miles, 30-in., under way, North Carolina-Virginia boundary to James River, Virginia; O. R. Smith Contracting Corp., contractor of Section 10. R. M. Jones, Altavista, Va., spreadman.

Transcontinental Gas Pipe Line Corp.—110 miles, 30-in., under way, James River, Virginia, to Potomac River, Virginia; O. R. Smith Contracting Corp., contractor of Section 11. C. C. Craig, Herndon, Va., spreadman.

Transcontinental Gas Pipe Line Corp.—75 miles, 30-in., contracted, Potomac River to Susquehanna River; Associated Pipe Line Contracting, Inc., contractor of Section 12. Cecil Rogers, Towson, Md., spreadman.

Transcontinental Gas Pipe Line Corp.—90 miles, 30-in., contracted, Susquehanna, Pa., to Delaware River; Wunderlich & Griffis Construction Co., contractor of Section 13.

Transcontinental Gas Pipe Line Corp.—61 miles, 30-in., contracted, Delaware River to Hackensack River, New Jersey; Wunderlich & Griffis Construction Co., contractor of Section 14.

Transcontinental Gas Pipe Line Corp.—23 miles, 30-in., under way, Edgewater to Elizabeth, N. J.; Oklahoma Contracting Co., contractor to Schedule 15. Louis Visentine, Edgewater, N. J., superintendent.

Transcontinental Gas Pipe Line Corp.—98 miles, 6-14-in., under way, Wharton, Tex., area; Altgelt Construction Co., contractor, Texas Unit 1.

Transcontinental Gas Pipe Line Corp.—58 miles, 4-14-in., under way, El Campo, Tex., area; T & R Construction Co., contractor, Texas Unit 1.

Transcontinental Gas Pipe Line Corp.—38 miles, 4-8-in., under way, Sinton, Tex., area; Shanks & Eustace, Inc., contractor, Texas Unit 2.

Williamson Gas Line Pigs* Traverse 1½R 90° Bends

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New Design
TYPE GP PIGS
with Brushes
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Wear

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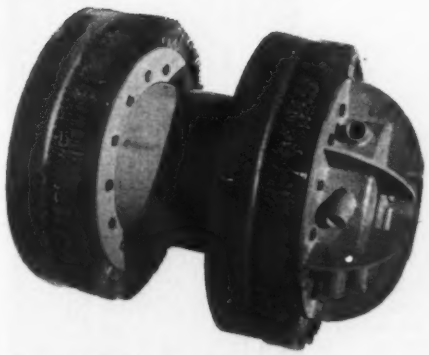
with
Jet Rotation
Feature to
Distribute
Wear



*Patents Pending

Above Designs Available in 16" and Larger.
Other Designs as Small as 2".

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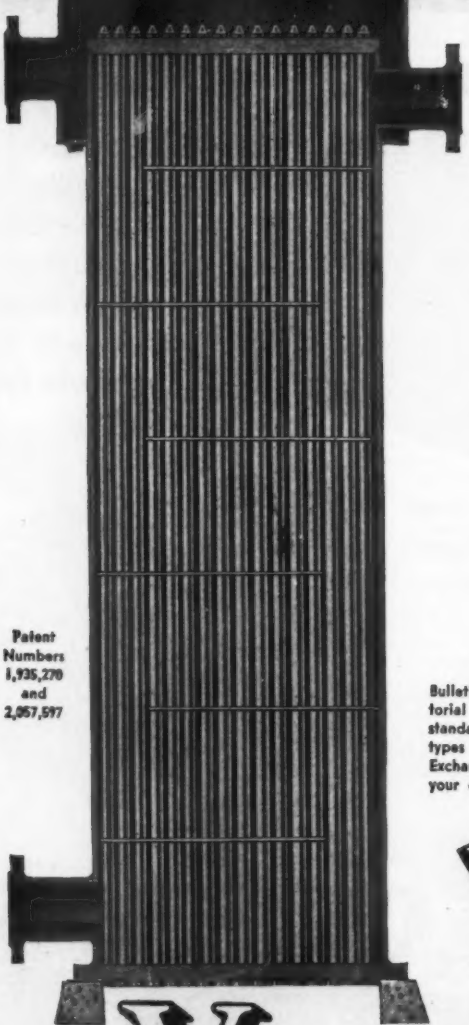
FILM TYPE EXCHANGERS

DETAIL SHOWING DISTRIBUTING FERRULE IN TUBE (Patent Pending)



Patent Numbers 1,935,270 and 2,057,597

Vogt engineers have taken a familiar refrigeration plant "old timer" and developed it into this modern, efficient heat exchanger.

The film type exchanger operates in a vertical position. Water introduced in the top chamber is distributed in a thin film against the inner tube walls by means of special ferrules. The shell side of the exchanger has baffles arranged to provide optimum velocities, pressure drops, and heat transfer rates. Shutdowns are eliminated because tubes can be cleaned while the unit is in operation; thus permitting the use of dirty, mud and silt depositing water.

Vogt Film Type Exchangers now serve as Jacket Water Coolers, Sulphuric Acid Coolers, and Sulphur Dioxide Condensers, and can be designed to condense any vapor. They are also applicable for handling liquids other than water in film flow.

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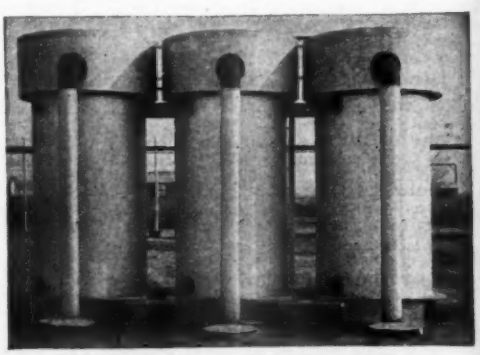
Branch Offices: New York, Philadelphia, Cleveland, Chicago, St. Louis, Dallas

Bulletin HE-5 is a pictorial presentation of standard and special types of Vogt Heat Exchangers. Write for your copy.



Jacket Water Coolers serving engines of 7,300 H.P. Muddy well water used as cooling medium.

Vogt

HEAT TRANSFER EQUIPMENT

REFINING

Record Runs

Refinery output reached all-time peak in August

REFINERY runs have averaged better than 6,000,000 bbl. daily in each of the past 3 weeks, reaching the all-time peak of 6,197,000 bbl. daily for the week ended August 26.

Operations in this week were at about 92.5 per cent of rated capacity, estimated at 6,700,000 bbl. daily. Since sustained runs are limited to about 95 per cent of total capacity, maximum throughput for any month would probably be about 6,365,000 bbl. daily.

Revised estimates of demand by the Bureau of Mines puts total demand for all products in the fourth quarter at 6,970,000 bbl. daily. Since sustained refinery output, based on existing capacity, is limited to 6,365,000 bbl. daily, refiners operating under pressure could supply all but 605,000 bbl. daily of the fourth-quarter demand out of current production.

Natural gasoline and cycling plants can supply about 500,000 bbl. daily of the expected winter demand.

Product imports for the 4-week period ended August 26 were estimated at 251,800 bbl. daily by A.P.I. but reached a postwar peak of almost 400,000 bbl. daily last March.

New high possible.—If product imports during the mid-winter months are held to the March level, total new supply in the first quarter of next year could be pushed to 7,265,000 bbl. daily, based on maximum sustained refinery output and expected production at light hydrocarbon plants.

Current trends indicate a probable total mid-winter demand greater than maximum new supply for the period. Oil-burner sales in the first half were up about 65 per cent over the same period last year. Residual-fuel consumption at electric power plants increased almost 50 per cent for the same periods. Demand for gasoline is about 10 per cent greater than last year. Increased industrial production will call for more fuel, and military requirements are rising.

While refineries may not operate at the maximum level even in the last quarter of this year, total runs for the year will set a new record, a short-lived record that will be broken in 1951.

Texaco Strike Possible

BEAUMONT, Tex. — A 60-day notice of dispute has been served by the local C.I.O. oil-workers union to the manager of The Texas Co.'s asphalt plant at Port Neches, Tex., which opens the possibility of a second strike at that plant.

R. C. Schorlemmer, manager, announced last week that the notice was served during negotiations which had been resumed on a new contract since reopening of the plant July 31, following a 114-day strike.

The asphalt plant reopened and

NELSON REFINERY-CONSTRUCTION INDEX

Appears in the first issue of each month.
Explanation—Cost-imating No. 61, December 15, 1949, pages 91, 92.
Compiled by W. L. Nelson—Refinery Consultant—Tulsa.
Indexes of Individual Equipment Items—January, April, July, October.

INDEX (1946 = 100)

	1947	1948	1949	May 1950
Centrifugal pumps	109.0	120.0	118.9	123.7
Reciprocating pumps	128.5	138.1	144.6	139.6
Compressor	114	128.0	120.0	117.0
Engines	109	120.0	115.5	113.2
Motors	110	112.7	114.0	129.0
Transformers	116	116.0	116.0	98.7
Instruments	113	120.0	122.0	123.1
Miscellaneous equipment average	114.2	122.1	121.6	120.6
Materials component	122.4	*139.3	143.6	145.7
Labor component	113.5	128.0	137.1	142.1
Refinery construction index	117.0	132.5	*139.7	143.5

*Revised.

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DESCO LUBRICANTS

Packed in convenient, time-saving, individual barrel size sticks. Packed 12 sticks to a carton. 6 cartons in a case.

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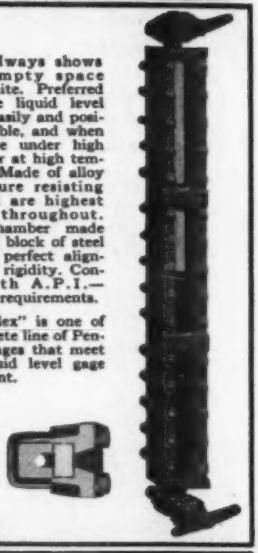

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

UOP
Inhibitor No. 4

negotiations resumed under a 60-day truce. Under the Taft-Hartley law, workers cannot walk off the job until after the 60-day notice of dispute.

Cat Cracker Planned

LOUISVILLE.—Louisville Refining Co., which operates a 6,000-bbl. refinery here, has announced that it will install a 3,000-bbl. per day catalytic cracking unit at its plant.

Construction on the U.O.P. unit, which will include all cracking facilities, will begin about October 1, and completion is scheduled for July 1951. The refinery also has thermal cracking capacity of 2,500 bbl. daily.

A.C.S. Division Created

NEW YORK.—A new scientific division of the American Chemical Society has been created and will be known as the the Division of High Polymer Chemistry, Dr. Ernest H. Volwiler, A.C.S. president, announced last week.

Prof. Carl Shipp Marvel, University of Illinois was selected first chairman of the new division, which held its initial sessions in Chicago September 4-6 during A.C.S.'s 118th national meeting. Prof. Herman F. Mark, director of Polymer Research Institute, Polytechnic Institute of Brooklyn, is division secretary. The division is the twentieth of the scientific and technical groups organized within the society.

High polymers are multiple molecular structures such as those making up plastics, fibers, and rubber.

A.P.I. Refinery Meet Set

TULSA. — The first technical session ever devoted to electrical equipment in petroleum refineries will be included in nine sessions of the Division of Refining, American Petroleum Institute, when the division holds its sixteenth midyear meeting here April 30-May 3.

Analytical research, corrosion problems, disposal of refinery wastes, training of personnel, and safety will be included in various sessions, which will be held at the Mayo Hotel.

Among those topics which will undergo thorough discussion will be motor fuels, including processing of stocks from crudes with high sulfur content, and high vapor pressure blending stocks.

W. M. Holaday, manager of Socony-Vacuum Oil Co., Inc.'s Laboratories, New York City, is chairman of the program committee.

All phases of corrosion problems will be presented in the refinery-safety meeting, and waste gases and dusts will be featured in a separate waste-disposal session.

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Railroads
Agriculture
Automotive

Among the Drilling Contractors

Carter Joins Lindas to Organize Drilling Firm

Nick Carter, lately associated with Mid-Continent Supply Co. as district manager at Wichita, has joined John Lindas, president of John Lindas Oil, Inc., Wichita, and H. C. Turner of the same company, in organizing the Carter Drilling Co., a three-way partnership.

NICK CARTER

Carter is general manager of the new drilling company. In addition, he will be associated with the John Lindas Oil, Inc., as director of materials, and will serve the latter companies in other capacities. Before his resignation, effective September 1, he had been with Mid-Continent Supply Co. nearly 6 years. Previously, he had had a wide range of experience in the oil and oil-field supply business in Texas, Louisiana, Arkansas, Oklahoma, Kansas and Nebraska.

The new company will share offices with John Lindas Oil, Inc., in the Union National Bank Building, in Wichita. In addition to rotary rigs, it will have cable tool units for "drilling in" and completing wells, making it possible to take complete contracts.

Kellogg Adds to List of Discovery Wells Drilled

Karl L. Kellogg & Sons, Los Angeles contracting firm, has made another addition to the list of oil discovery wells it has drilled. The latest addition is a wildcat producer recently completed for Hancock Oil Co. in Northwest Cuyama, San Luis Obispo County, California. The well, located 2¾ miles northwest of the new Morales field, pumped initially at the rate of 225 bbl. of oil daily from a sand topped at 5,644 ft. It had been drilled to a total depth of 6,235 ft. and then plugged back to 6,020 ft.

Deep Test Contracted

Rocky Mountain Drilling Co., Los Angeles, has the drilling contract for the deep test which the U. S. Navy and Standard Oil Co. of California are undertaking for the Elk Hills field, San Joaquin Valley, California. The test is projected to a depth of 14,000 ft.

Big Chief Western Corp., Denver, is nearing contract depth of 6,000 ft. in a wildcat test it is drilling for

W. B. Kimbrell (extreme left), coowner of K & E Drilling, Inc., Wichita, with Fleet McClellan (second from left), Mountain Iron & Supply Co., Wichita, and crewmen on one of the contractor's rigs operating in the Bartholomew pool, Sedgwick County, Kansas. Crewmen, left to right, are: Orville P. Anderson, derrickman; Glen F. Reid, floorman; C. T. Honaker (rear), driller; and Barney J. Brunetti.

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CASING HEADS

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LUBRICATED PLUG VALVES

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DRILL COLLAR CLAMP

The "VARCO" Drill Collar Clamp is a heavy duty safety device. No drill collar slips needed if used with heavy plate atop the master bushing. Movable slip inserts with VARCO buttons, complete within itself; no extra parts needed. For drill collar sizes 4½" to 8" inc. Chrome alloy heat treated steel. Write for complete data. A Tubing and Bailer Clamp of similar construction is available, handling sizes from 2⅜" to 4½".

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P. O. Box 748, Odessa, Texas

Chicago Corp. and associates in Paradox Valley, Montrose County, Colorado. The test is 1 Ayers. Location is in the C NW SW 31-47n-18w.

B. G. Byars Drilling Co., Tyler, Tex., has the contract to drill Peveto & Byars 1 Poindexter, a wildcat test in the McGuffin Survey, near Fairfield, Freestone County, East Texas.

Whitehurst Drilling Co., Shreveport, is drilling Marine Oil Co. 1 Johnson, a south offset to the recently completed discovery well of the North London field, Union County, Arkansas. Location is in the C N½ SW NE 33-17s-12w. Contract is for 6,000 ft.

Jackson Drilling Co., Wichita, has a rig running for Westgate-Greenland Oil Co. on a wildcat location, 5 miles southwest of the Bartholomew pool in eastern Kingman County, Kansas. The test is on the Beck land in the NE NE NE 29-28-5.

Tools of **Skeeter & Curry** are being used on a 3,650-ft. wildcat test being started by G. H. Bigsby in the area 4 miles southwest of Blevins, Hempstead County, Arkansas. The test is 1 Avery, NW NW 4-11s-23w.

Stagg Drilling Co., Chase, Kans., is contractor on a wildcat test which Musgrove Petroleum Corp. is starting in the NW NW SE 6-24-14, western Stafford County, Kansas. The location is 4 miles northwest of the West Rattlesnake pool.

Rowan Drilling Co., Houston, is moving a rig to a location nearly 2 miles to the south of Texas Pacific Coal & Oil Co.'s recently completed Wilcox sand discovery well in the Glenmora area, Rapides Parish, Central Louisiana, where it will drill a 10,800-ft. test for the same company. The new test is 1 Gill. Its location is in the C SE SE 23-1s-2w. The discovery well, 1 Elliott, C NW SW 35-1s-2w, was drilled to a total depth of 10,812 ft. and completed with casing perforations around a 10,700 ft. level.

ROTARY RIGS IN OPERATION*
(United States and Western Canada)

Area—	Week ended 8-28-50	Change week ended 8-21-50	Change week ended 8-29-49
Gulf Coast	503	—13	— 32
W. Tex.-N. M.	735	— 6	+216
Ark.-La.-E. Tex.	151	— 5	— 14
Oklahoma	290	—22	+ 65
Kansas	137	+24	+ 28
Illinois-Eastern	137	+ 4	+ 11
Rocky Mountains	121	0	+ 8
Pacific Coast	135	0	— 35
Total United States	2,209	—18	+247
Western Canada	89	0	+ 20
Total	2,298	—18	+267

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Pacific Coast and Illinois-Eastern areas are shown by charts on pages 136 and 137.

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The accepted method for assuring an uninterrupted supply of feed water to oil field boilers. Penberthy Automatic Injectors will supply feed water to boilers at minimum cost, are quickly and easily installed, reliable under most severe operating conditions, require little attention and no careful handling. Highest quality design and rugged construction.

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25% MORE CONDENSATE

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With condensate recovery increases like this, HYRECO PROCESSING UNITS are paying their way in 40 to 60 days. From then on its EXTRA PROFITS, month after month. HYRECO is the only unit of its kind with a record of proven performance . . . a record for consistently recovering more condensate per cubic foot of gas produced than any other high pressure well head process known today.

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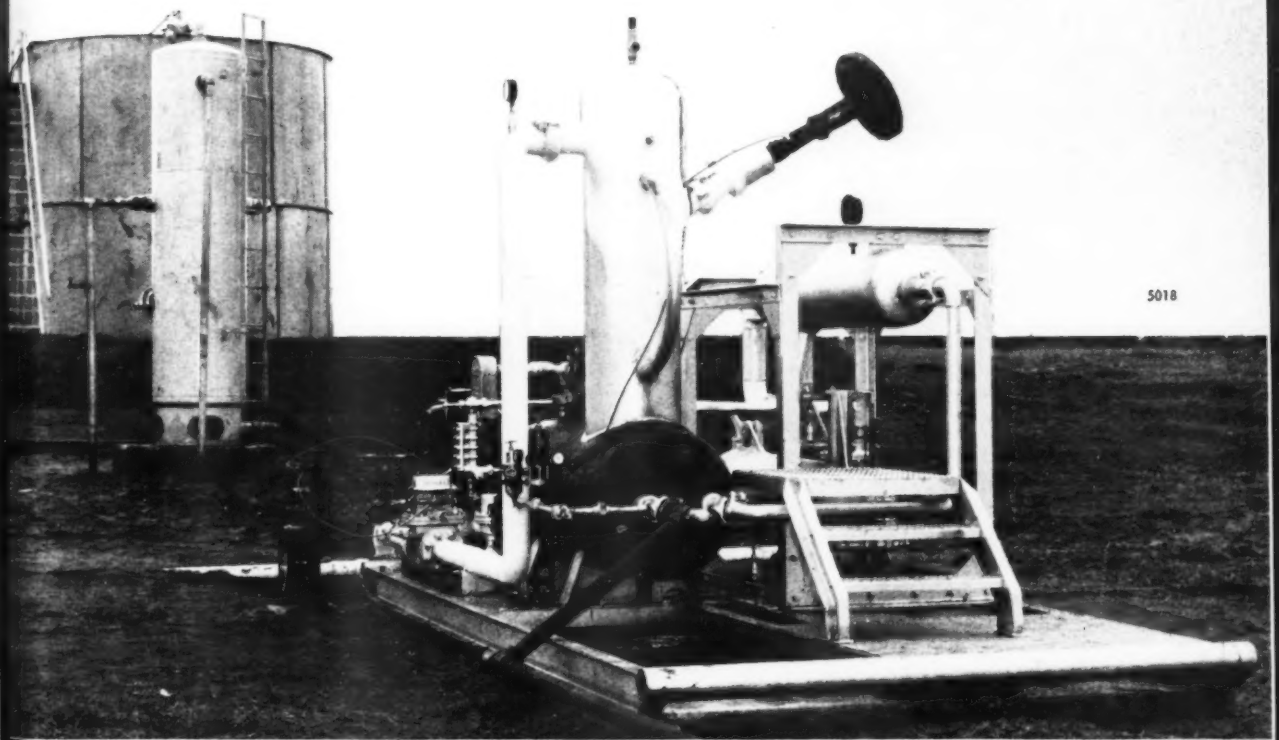

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U. S. Patent 2,466,639 April 5, 1949

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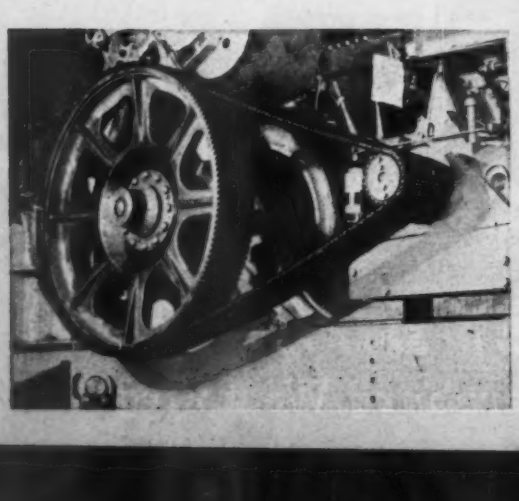
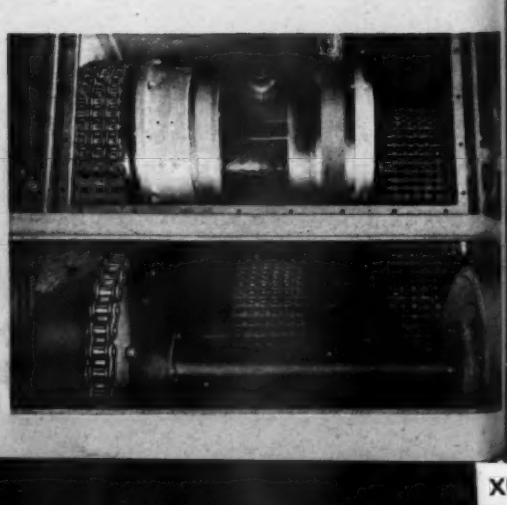
DIAMOND ROLLER CHAINS

The file-hard bushings resist wear, add life.

This shows the pairs of bushed center plates through which connecting link pins pass.



For Heavy Duty jobs, multiple-strand Diamond Roller Chain with new Connecting Links add extra life and reduce costs.



Exploration and Drilling

Julesburg Basin Trend 90 Miles Long

DEVELOPMENT of five oil and gas-producing areas in the Julesburg basin of southwestern Nebraska and northeastern Colorado has established a production trend that stretches for 90 miles along an arc, which roughly parallels the eastern and southeastern limits of this sedimentary basin. Wells in all five areas produce from the Graneros sands of Cretaceous age.

There are still large gaps in this trend, and it is in these gaps that the major portion of exploratory efforts will be devoted in the immediate future. From the northern part of the Gurley-Huntsman oil and gas-producing area in 14, 15n-49w, Cheyenne County, Nebraska, where Ohio Oil Co. is the principal operator, it is 30 miles south and west to the Armstrong area, 11n-53w, Logan County, Colorado, which British-American Oil Producing Co. opened last May. About 12 miles south of the Armstrong area is the Walker area, 9n-53w, which was opened in August by another British-American discovery. Also completed in August were Trigood Oil Co.'s discovery in the Merino area, 6n-54w, 20 miles south and west of the Walker area; and, Adams Drilling Co. and J. M. Huber Corp.'s discovery in the Fort Morgan area, 2n-57w, Morgan County, which is 28 miles south and west of the Merino area.

This slightly developed production trend appears to be controlled by an as yet undeterminable amount of reversal in the regional dip, which runs about 30 ft. to the mile in a westerly direction in this portion of the basin. This "ridge" extends from south of the Fort Morgan area wells northeastward to the Gurley-Huntsman area, and then elbows to the northwest to continue for an unknown distance.

All of the pools found so far have been drilled on seismic highs along this ridge, but not all seismic highs drilled have produced. Some of the best prospects, with closure up to three times greater than producing structures, have failed to find production because of the absence of proper sand development. Structural relief at the pools so far found has been slight, and it is probable that stratigraphic traps formed by lensing sands or facies changes are as much, if not more, responsible for the accumulation of oil and gas than structural conditions.

Development to date indicates that the Julesburg basin is more Mid-Continent than Rocky Mountain, in spite of its geographical location. It is not expected that any spectacular pools will be found in the basin, but rather that development will proceed much as it has along the Central Kansas uplift. Development costs, producing costs, and recovery per acre are considered comparable to central Kansas on the limited data available. There is a sizable local market for the gas reserves being developed, which will ultimately yield substantial revenue.

When Gurley pool was found last year it was believed that the producing sands were in the Dakota. Later, they were called Muddy. Then, foraminifera found in British-American 1 Segelke, discovery well of the Armstrong area, definitely proved the horizons there to be younger than Muddy. However, since there are also indications that the oil and gas-bearing sands climb within the section from north to south, most geologists are temporarily content to call them no closer than Graneros.

There are many confusing results of drilling in the pools thus far discovered. A well offsetting one that has water in the first sand and oil in the second, may find oil in the first sand and water in the second, or, water in both sands. Cores from some sand intervals are apparently completely saturated with oil, yet a drill-stem test of the cored interval yields only water. One operator is toying with the theory that these lensing sands are "filling." That is, that the oil is just now moving into place. The area is definitely not a flushed one because cores from flushed areas show no oil or spotting. This theory, far from being proven, is not beyond the realm of possibility. The slight structural relief and the lenticularity of the sands in the basin could have prevented as rapid a segregation as has occurred in some of the steep structures of Wyoming.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

MID-CONTINENT.—Carter Oil Co. 1 O. Strahm, Nemaha County, Kansas, wildcat, has now found good showings in the Viola in addition to having proved oil in the Hunton. In southeastern Stephens County, Oklahoma, an outpost test of Sinclair is showing for a multi-sand producer in area between Velma, Camp and Milroy pools.

ROCKY MOUNTAIN AREA.—Estimates of as much as 20,000,000 cu. ft. of gas daily are made for an apparent new Graneros discovery in the Julesburg Basin, Nebraska. Carter and Stanolind Oil & Gas Co. completed their second oil producer at Roosevelt and are nearing the basal Green River sand objective in the Blue Bell, Utah, wildcat. A new-pay discovery for the Happy Springs area, Wyoming, is being completed by Sinclair Oil & Gas Co.

SOUTHEASTERN NEW MEXICO.—Amerada Petroleum Corp. 1-S-A State, Lea County, wildcat 1½ miles northeast of Gulf Oil Corp. 1 Maud Saunders, unloaded 9,486 ft. of 40.5-gravity oil with water and mud from test of Permo-Pennsylvanian near 10,000 ft. depth. Stanolind 3 South Mattix assured Silurian production for Fowler Ellenburger pool of southeastern Lea County when it flowed 36 bbl. of oil per hour on a drill-stem test at 7,695-7,745 ft.

MICHIGAN.—Allegan County may have a new Traverse oil discovery in its James J. McGerry, Trustee, 1 Smith. Otsego Township wildcat, which showed 75 ft. or more of free oil, natural, with no water.

XUM

Kansas

Nemaha County Wildcat Finds Oil in Second Zone

DEEPENED from the Hunton lime, where it had promising oil and gas showings, Carter Oil Co. 1 O. Strahm, NW SW NW 13-2-14e, Nemaha County wildcat, has found additional good showings in the Viola lime. Top of the Viola was logged at 3,480 ft. (—1,228 ft.). Hole was cored to 3,504 ft. for an initial drill-stem test, which resulted in a recovery of 1,685 ft. of oil and 300 ft. of water in the break-down. The test took in an interval from 3,483 ft. to bottom. Tool was open 2 hours. Hole then was deepened another 5 ft. to 3,409 ft., where the second drill-stem test was made. In this test, there was a recovery of 970 ft. of oil and 300 ft. of water.

Six drill-stem tests were made in the Hunton lime, top of which was logged at 2,825 ft. (—1,573 ft.). Intervals tested and resultant recoveries of the respective tests were: 2,826-29 ft., 400 ft. of oil; 2,829-34 ft., 100 ft. of oil and 10 ft. of mud; 2,843-49 ft., 30 ft. of oil-cut mud; 2,849-59 ft., 2,100 ft. of oil; 2,859-64 ft., 8 ft. of slightly oil-cut mud; 2,864-74 ft., 2,100 ft. of brackish water.

Location of this discovery, in the Forest City Basin, is about 3 miles north of Carter's Strahm pool, in the northern part of the county, near the Nebraska line. The Strahm pool has two wells, one (the discovery well) producing from the Hunton lime, and the other, completed this year, producing from the Viola.

Testing is under way at Skelly Oil Co. 2 Thoewe, SW SE NE 2-13-10e, Wabaunsee County, another prospective, Forest City Basin oil discovery well. When cement was drilled out, and the rotary hole deepened 1 ft. to a new total depth of 2,927 ft., oil rose to within 50 ft. of the surface. Prospective pay zone of this well is the Viola lime, topped at 2,923 ft. (—1,816 ft.). Casing is at 2,924 ft., leaving 3 ft. of open hole in the pay.

Honaker Drilling Co. has completed its 1 Birzer, NW NW SE 17-19-11, a wildcat northeast of Ellinwood, Barton County, opening the Southeast Hammeke pool. The well, producing from the Lansing-Kansas City section, was given a state potential rating of 1,267 bbl. of oil per day. Casing is perforated at 3,089-96 ft. with hole plugged back to 3,100 ft. from its original total depth of 3,380 ft.

Crown Oil Co. 1 VanWinkle, NW SW SW 23-21-14, which opens the VanWinkle pool in northwestern Stafford County, pumped 75 bbl. of oil per day on a potential test. Its production also is from Lansing-Kansas City lime, topped at 3,419 ft. (—1,484 ft.). Casing is perforated at 3,501-04 ft., 3,570-74 ft., and 3,592-96 ft.

Jones, Shelburne & Farmer 1 Sutor, SW SW NE 2-10-21, an outpost test in the area east of the recently opened DeYoung and Northwest Bass pools, south of the Morel pool, in southeastern Graham County, has run casing to test promising oil showings encountered in Arbuckle lime, topped at 3,839 ft. A drill-stem test, taking in an interval at 3,828-47 ft., resulted in a recovery of 1,100 ft. of oil. The location is ½ mile southeast of the DeYoung pool and about the same distance northeast of the Northwest Bass pool.

Derby Petroleum Co. and associates may have a small producer in their 1 Whisman, NW NW SE 9-9-20, Rooks County wildcat, where casing has been run to test oil showings in Arbuckle lime, topped at 3,655 ft. (—1,499 ft.). Total depth is 3,661 ft. with 4½-in. oil string cemented on top the zone. A 25-minute drill-stem test yielded 10 ft. of oil-cut mud.

KANSAS SUCCESSFUL WILDCATS

Barton County: Honaker 1 Birzer, NW NW SE 17-19s-11w, elev. 1,776 ft., flowed 1,267 ft. of oil per day from Lansing at 3,089-96 ft., TD 3,380 ft., Topeka 2,670 ft., Heebner 2,928 ft., Douglas 2,980 ft., lime 3,045 ft., Lansing-Kansas City 3,065 ft., Sooy 3,339 ft.

Rooks County: Anschutz 1 Grover, CEL NE NE 22-7s-19w, elev. 1,935 ft., pumped 143 bbl. of oil per day from Lansing at 3,272-80 ft. and 3,296-3,303 ft., TD 3,427 ft., anhydrite 1,430 ft., Topeka 2,880 ft., Lansing-Kansas City 3,126 ft., Arbuckle 3,396 ft.

Heathman 1 Raymond "A," NW NW NW 30-10s-20w, elev. 2,118 ft., pumped 124 bbl. of oil per day from Arbuckle at 3,706-08 ft., TD; anhydrite 1,585 ft., Heebner 3,354 ft., Lansing-Kansas City 3,394 ft., Arbuckle 3,705 ft.

KANSAS WILDCAT FAILURES

Butler County: Texas Co. 1 Keller, NE NE NW 32-29s-3e, elev. 1,260 ft., dry, TD 3,345 ft., Topeka 1,420 ft., Heebner 1,810 ft., Douglas 1,920 ft., Lansing-Kansas City 2,085 ft., Stalnaker 2,121 ft., Kansas City lime 2,432 ft., Mississippian 2,941 ft., Simpson 3,294 ft., Arbuckle 3,297 ft.

Ellis County: G-M-R 1 Stecklein, SW SW SW 34-11s-18w, elev. 2,151 ft., dry, TD 3,783 ft., anhydrite 1,450 ft., Heebner 3,372 ft., Toronto 3,392 ft., Lansing-Kansas City 3,410 ft., Sooy 3,716 ft., Arbuckle 3,753 ft.

Graham County: Jones-Shelburne & Farmer 1 Sutor, SW SW NE 2-10s-21w, elev. 2,287 ft., dry, TD 3,843 ft., anhydrite 1,725 ft., Topeka 3,285 ft., Heebner 3,492 ft., Lansing-Kansas City 3,533 ft., Simpson 3,832 ft., Arbuckle 3,840 ft.

Peel-Hardman et al 1 Sutor "C," SE SE NW 31-9s-22w, elev. 2,332 ft., dry, TD 4,020 ft., anhydrite 1,890 ft., Heebner 3,571 ft., Lansing-Kansas City 3,608 ft., Sooy 3,985 ft.

Peed-Hardman-Shields 1 Calhoun, NE NE SE 18-8s-21w, elev. 2,064 ft., dry, TD 3,630 ft., anhydrite 1,595 ft., Arbuckle 3,592 ft.

Greenwood County: Nelson et al 1 Holderman, SW NW NE 17-25s-13e, dry, TD 1,621 ft., Mississippi lime 1,596 ft.

Evans et al 1 Brown, NE NW SE 4-28s-12e, dry, TD 1,490 ft., no tops reported.

Lyon County: Anderson et al 1 Grimmet, SW SE NE 22-18s-10e, elev. 1,231 ft., dry, TD 1,652 ft., Heebner 970 ft., Lansing 1,265 ft., Kansas City 1,379 ft.

Nemaha County: Hogoton 1 Lancaster, SE SE SE 20-2s-15e, elev. 1,324 (?) ft., dry, TD 3,742 ft., Howard 880 ft., Topeka 932 ft., Lansing-Kansas City 1,314 ft., Mississippi lime 2,512 ft., Kinderhook 2,688 ft., Hunton 2,906 ft., Maquoketa 3,588 ft., Viola 3,651 ft.

Norton County: Texas Co. 1 Criswell, SW SW SW 14-5s-21w, elev. 2,170 ft., dry, TD 3,620 ft., Heebner 3,316 ft., Lansing-Kansas City 3,338 ft., Sooy 3,600 ft.

Phillips County: B & R 1 Dill, CWL SW NE 18-2s-18w, N. Dayton area, elev. 2,186 ft., dry, TD 3,573 ft., anhydrite 1,805 ft., Topeka 3,180 ft., Heebner 3,408 ft., Lansing-Kansas City 3,442 ft.

Deep Rock 1 Van Koopen, NW NW SE 15-2s-19w, elev. 2,204 ft., dry, TD 3,771 ft., Topeka 3,126 ft., Heebner 3,340 ft., Lansing-Kansas City 3,373 (?) ft., Arbuckle 3,726 ft.

Rooks County: Anschutz 1 McConchie, NE NE NW 27-9s-18w, Paradise Creek area, elev. 2,158 ft., dry, TD 3,664 ft., Topeka 3,110 ft., Heebner 3,326 ft., Toronto 3,348 ft., Lansing-Kansas City 3,366 ft., Sooy 3,593 ft.

Peel-Hardman et al 1 Ranner, NW NE SW 31-9s-20w, elev. 2,297 ft., dry, TD 3,957 ft., anhydrite 1,767 ft., Heebner 3,564 ft., Lansing-Kansas City 3,600 ft., Sooy 3,919 ft.

Stafford County: Derby 1 Strickler, SE SE NE 28-21s-14w, elev. 1,935 ft., dry, TD 3,900 ft., Heebner 3,308 ft., lime 3,428 ft., Lansing-Kansas City 3,437 ft., Sooy 3,694 ft., Viola 3,740 ft., Simpson 3,812 ft., Arbuckle 3,840 ft.

Armer 1 Wetig, CNL NW NW 31-21s-13w, elev. 1,917 ft., dry, TD 3,772 ft., anhydrite 800 ft., Heebner 3,250 ft., lime 3,372 ft., Lansing-Kansas City 3,383 ft., Viola 3,640 ft., Simpson 3,691 ft., Arbuckle 3,752 ft.

Trego County: Continental 2 Walz, NW NW NE 14-11s-21w, elev. 2,232 ft., dry, strat test, no other information available.

EASTERN NEBRASKA WILDCAT FAILURE

Lancaster County: Pyramid et al 1 Miles, NE NE NW 19-9n-5e, elev. 1,386 ft., dry, TD 1,950 ft., DST in Simpson 1,739-50 ft. water, granite wash 1,894 ft.

Southwest Texas

Second Producer in "AAA" Field Opens New Pay Zone

CORPUS CHRISTI.—J. S. & R. H. Abercrombie and Atlantic Refining Co. have run potential gage on the 1 L. E. Fite, second producer and new pay pay sand, in "Triple A" field of San Patricio County. On 24-hour test, the well flowed 111 bbl. of 44.5°-gravity oil daily through perforations at 7,148-50 ft. This is a new pay zone for the field. The operator's 1 Nelson flowed 163 bbl. of 23.8°-gravity oil daily through perforations at 6,666-69 ft.

A new gasser has been completed in Webb County at Magnolia Petroleum Co. 1 Lopez Estate, T&NO Survey 139. No details are known as to where perforations were made. However, the well flowed 8,400,000 cu. ft. of gas per day on open flow. The well was drilled to a depth of 6,706 ft., plugged back to 2,560 ft. and 7-in. production casing set at 2,560 ft.

O. W. Killam 2 Floyd Billings, new oil discovery 4½ miles west of Lopez field, Webb County, has been completed for 65 bbl. of 31.9°-gravity oil per day through perforations at 2,393-2,405 ft. There was no water on the test and gas-oil ratio was too low to measure. The new discovery is located in Block 1 of the CCSD&RGNG Survey 39, 16 miles north of Bruni.

A prospective discovery in LaSalle County is Sixnod Oil Corp. 1 Girard, 2 miles southwest of Charlotte field. Operators have perforated 30 ft. of the Escondido sand at 5,480-5,510 ft. and are now running test on the well. It is felt that this is a trend running southwestward from Charlotte field of Atascosa County.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

San Patricio County: New pay at "Triple A"—J. S. & R. H. Abercrombie and Atlantic Refining Co. 1 L. E. Fite, Robert Saddler Sur., A-233, 3 mi. NW of Taft, top pay 7,130 ft., TD 7,455 ft., perf. 7,148-50 ft., IP: 111 bbl. oil per day, 11/64-in. choke, TP 2,490 psi., 44.5° gravity.

New oil discovery—Superior Oil Co. 1 J. F. Odem, et al, John Henderson Sur., A-156, ½ mi. NE of Sinton, top pay 6,650 ft., TD 8,344 ft., perf. 6,650-60 ft., IP: 122 bbl. oil per day, 8/64-in. choke, TP 700 psi., 39° gravity.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Atascosa County: Casa Grande 1 J. D. McNutt, Edwards Estes Sur., 188, A-222, 4½ mi. SW of Jourdonton, dry, TD 1,543 ft.

Duval County: Hancock Oil Co. of Calif. 2 Driscoll Estate, T&NO Sur. 5, A-608, 16 mi. NW of San Diego, dry, TD 3,897 ft.

Edwards County: Nelson Bunker Hunt & William Hamm 1 G. F. Stewart, 19 mi. S SE of Sonora, dry, TD 6,168 ft.

Kendall County: Kendalie Co., Inc., 1 William Haag, Simon Schneider Sur. 174, 16 mi. NE of Boerne, dry, TD 1,364 ft.

San Patriocio County: Irene Oil & Gas Co. 2 Collins, Ed J. McGloin Sur., 2½ mi. NW of William field, dry, TD 4,351 ft.

Webb County: Delhi Oil Corp. 1 A. M. Bruni Estate, J. V. Borrego Grant, 6 mi. SW of Aquilaxis, dry, TD 5,700 ft.

Zavala County: Sam C. Dunlap, III, and Ginther- Warren & Ginther 1 O. J. Worm & Jo W. Cosner, Pedro Jose de Aguirre Grant, 5 mi. N of Crystal City, dry, TD 3,718 ft.

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North Central Texas

Stonewall County Has Strawn Sand Discovery

WICHITA FALLS.—Deep Rock Oil Corp. has completed 1 C. B. Long as a Strawn-sand discovery 16 miles northeast of Aspermont, Stonewall County. The wildcat flowed 106.56 bbl. of 37.2°-gravity oil a day using a ¾-in. choke. TP was 20 psi. and GOR 300 cu. ft. The well is in Section 2, Block H, F. T. Oliver 2 Survey. Elevation is 1,585 ft. The Strawn sand was topped at 5,129 ft. Production is from open hole from 5,124-34 ft. The well is 7 miles north and a little west of C. L. Norsworthy, Jr., 1 Wiley, Bend conglomerate discovery in Aspermont north pool.

Rowan & Hope 1 Catherine Berry et al, Section 217, Block D, H&TC Survey, Stonewall County wildcat 8 miles north of Swenson, was drilling below 5,360 ft. Permit depth is 6,500 ft. Skelly Oil Co. 1 Cleve Hamilton, A. Reed Survey, A-1066, southeast offset to Roark, Hooker & Hill 1 Williams, Bend conglomerate discovery 7 miles north of Old Glory, was drilling below 4,935 ft.

Texas & Pacific Coal & Oil Co. 1 W. H. Bennett, Section 31, Block 20, T&P Survey, wildcat in the northeast corner of Nolan County, ran a drill-stem test from 5,875-99 ft. Open 2 hours and 15 minutes, there was gas at the surface in 12 minutes. Recovery was 180 ft. of very heavily oil-and-gas-cut mud and 1,620 ft. of salt water. Drilling continued from 5,954 ft. in lime and shale on a 7,000-ft. contract. Sun Oil Co. 3 Beatrice K. Stone, Section 76, Block X, T&P Survey, wildcat 11½ miles southwest of Sweetwater, was drilling from 6,077 ft. in lime after receiving 45 ft. of very slightly gas-cut mud in a drill-stem test of the 5,955-6,002-ft. interval. The tool was open for 60 minutes with a slight blow for 24 minutes. The wildcat is scheduled to drill to 6,800 ft.

A new Strawn sand oil pool for northeastern Young County has been opened with the completion of Champlin Refining Co. 1 W. J. Hawkins, Block 1914, TE&L Survey, 3 miles northwest of Loving. The discovery pumped 75.29 bbl. of 42°-gravity oil a day on official test after acidizing the pay from 3,571-87 ft. with 500 gal. The wildcat topped the Caddo lime at 4,255 ft. It was drilled to 4,819 ft. and plugged back to 3,650 ft. for completion.

Cities Service Oil Co. 1 Certainteed Products Co., Hardeman County wildcat 2 miles north of Quanah, was drilling below 6,165 ft. A 2-hour drill-stem test of a sand, lime, and granite wash section from 6,128-63 ft. recovered 30 ft. of very slightly gas-cut mud and 270 ft. of salt water. This section was in the lower Strawn and the well will be carried to the Ellenburger.

D. H. Bolin completed 1-C P. Howard, wildcat in F. Robertson Survey A-620, 14 miles north of Nocona, Montague County, as a shallow discovery from Crinoidal lime pay from 1,630-48 ft. On official test the well flowed 192 bbl. of 30°-gravity oil a day through ½-in. choke. GOR was 120 cu. ft. An extension 300 ft. west of the discovery has been completed to flow 169 bbl. of 30°-gravity oil a day. Production is from 1,700-50 ft. It is 2-C P. Howard.

Cities Service 1-207 Swenson, wildcat 10 miles northwest of Throckmorton, Throckmorton County, Section 207, BBB&C Survey A-127, has been completed as a discovery well through perforations in the Caddo from 4,738-75 ft. after being treated with 500 gal. of acid. On official test it flowed 111.89 bbl. of 39.2°-gravity oil in 7 hours through a 24/64-in. choke. GOR was 175 cu. ft. TP was 175 psi. The well had good shows in the Mississippian which was topped at 5,152 ft. Top of the Caddo was at 4,734 ft.

NORTH TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Brown County: B. R. W. Oil Co. 3 Jess Jopling, H. C. Collins Sur., 3 mi. W

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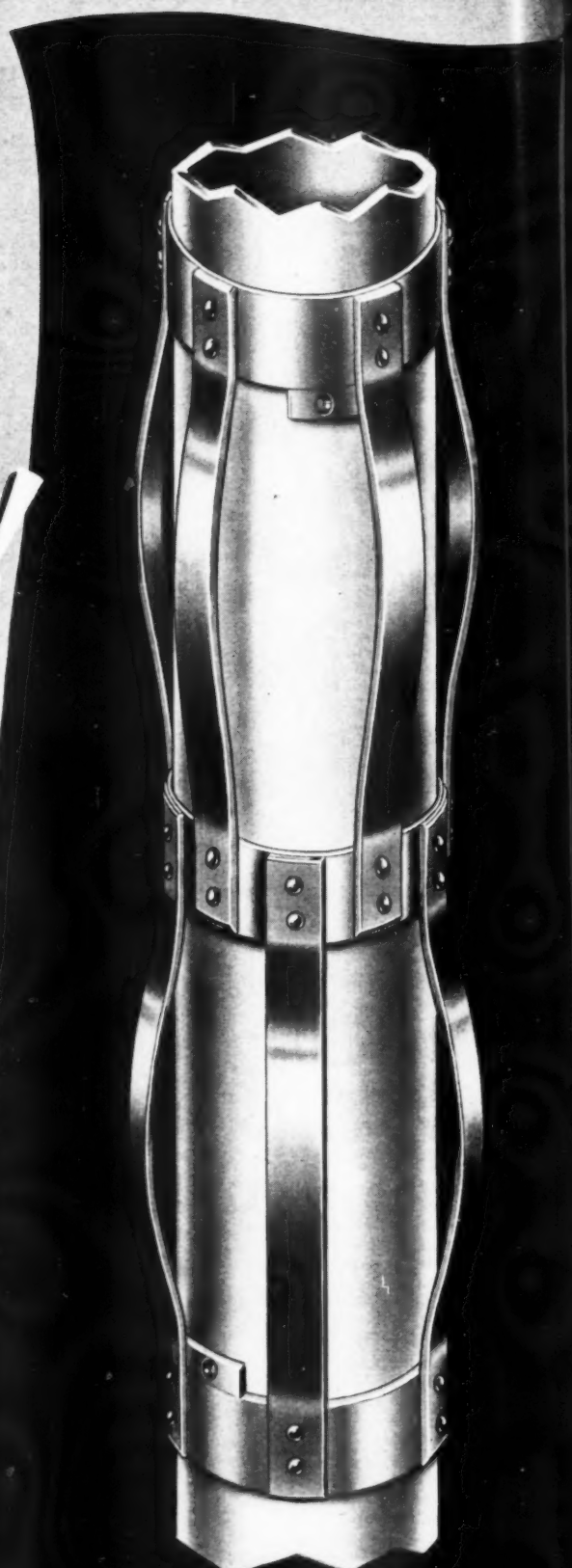

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Brownwood, TD 445 ft., elev. 1,513 ft., pumped 7.42 bbl. 30°-gravity oil a day, top of pay 439 ft.

Denhart & Davis 2 Fred White, D. B. Vernon Sur., A-935, 3 mi. W Thrifty, TD 1,323 ft., elev. 1,515 ft., pumped 30 bbl. 42°-gravity oil a day, top of pay 1,227 ft., GOR 100 cu. ft.

Coleman County: Harry Todd 1 W. P. West, Blk. 7, GC&SF Surbn., Santa Anna townsite, TD 1,785 ft., elev. 1,718 ft., flowed 128 bbl. 41.1°-gravity oil a day througs ⅛-in. choke, perforations 1,774-85 ft., Winchell lime 1,170 ft., GOR 900 cu. ft., CP 300 psi., TP 160 psi.

Yeatman Drlg. Co. 1 Maggie Powell, BBB&C Sur. 23, 5 mi. NW Coleman, TD 2,737 ft., elev. 1,904 ft., flowed 110.40 bbl. 42°-gravity oil a day through 25/64-in. choke, top of pay 2,725 ft., GOR 1,200 cu. ft., TP 40 psi.

Jones County: J. O. Fox, Jr., and R. E. Ransdell et al 1-A Henry Sayles, Sayles Subd. of Sur. 1, Blk. 20, T&P Sur., 3½ mi. SE Hawley, TD 2,002 ft., elev. 1,616 ft., pumped 66 bbl. of 40.7°-gravity oil a day, top of pay 1,988 ft.

Montague County: D. H. Bolin 1 Cato Heirs, F. Robertson Sur., 11 mi. N Nocona, TD 3,264 ft., flowed 120 bbl. 30°-gravity oil a day through 16/64-in. choke, top of pay 2,692 ft., GOR 160 cu. ft., CP 650 psi., TP 150 psi.

Young County: Willis Drlg. Co. 1 C. R. Funk et al, O. D. Lisle Sur. A-2221, 4 mi. SE Bunger, TD 2,631 ft., elev. 1,175 ft., flowed 157.96 bbl. 38.8°-gravity oil a day through 6/64-in. choke, top of pay 2,630 ft., GOR 500 cu. ft., CP 400 psi., TP 140 psi.

NORTH TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Meredith Drlg. Co. 1 Mid-Continent Pet., Blk. 23, SPRR Sur. 1, A-402, 4½ mi. N Megargel, dry, TD 1,476 ft., elev. 1,513 ft.

Brown County: Clarence F. Chang and Associates 1 C. E. Boase, P. A. Ackerman Sur. 314, 5 mi. NE Zephyr, dry, TD 585 ft., elev. approx. 1,400 ft.

A. Gutowsky, Inc. 1 Roy Witt, Sec. 2, Blk. 6, BBB&C Sur., 1½ mi. SE May, dry, TD 1,105 ft., no shows.

Baylor County: J. J. Lynn 1-C Claude Cowan, Sec. 2, Blk. B, HT&B Sur., 15 mi. E Seymour, dry, TD 5,148 ft.

Clay County: Southern Pet. Exploration and Charles E. Morrison 1 W. E. Huff et al, J. Bradshaw Sur. A-17, 6 mi. NE Wichita Falls, dry, TD 3,620 ft., granite 3,608-20 ft.

Coleman County: H. R. Burden 2 P. J. Reeves, B. Ferguson Sur. 743, 3 mi. S Coleman, dry, TD 2,338 ft., elev. 1,672 ft.

Robert Page 1 Jennie Eubank et al, Blk. 65, Wm. Doran Sur. 666, ½ mi. SW Santa Anna, dry, TD 2,001 ft., no shows.

John G. Pundt 1 L. C. Pearce, Blk. 5, Coleman CSL Sur. 57, 6 mi. E Coleman, dry, TD 2,207 ft., elev. 1,739 ft., Fry 2,087 ft.

Comanche County: H. J. Kirk 1 Della Jones, S. Howland Sur. 3, 5 mi. E May, dry, TD 3,161 ft., elev. 1,548 ft., Barnett 2,872 ft., Ellenburger 2,956 ft.

Cooke County: G. F. G. Oil Co. 1 Mary C. Brown, B. J. Thompson Sur. A-1006, 3½ mi. SE Myra, dry, TD 2,137 ft., elev. 895 ft.

Russell & Russell 1 Taylor Lewis, M. Langham Sur. A-564, 5 mi. S Myra, dry, TD 1,830 ft., elev. 946 ft.

Eastland County: Cooper & Hemphill 1 W. T. Hittson, Sec. 73, Blk. 4, H&TC Sur., 5 mi. NE Cisco, dry, TD 4,106 ft., elev. 1,476 ft., Mississippian 3,981 ft.

Jack County: C. W. Clark 1 D. Burke, Blk. 5, M. Rockerfellow Sur. A-484, 2 mi. NW Antelope, dry, TD 759 ft.

Warren Oil Corp. 1 Billie Yates, John A. Little Sur. A-349, 3 mi. NE Vingard, dry, TD 5,697 ft., Caddo 4,780 ft.

Jones County: Humble Oil & Refining 1 J. I. Milsap, Sec. 67, Harrison CSL Sur., Lge. 333, 8 mi. W Anson, dry, TD 3,464 ft., elev. 1,891 ft.

French M. Robertson et al 1 Buford Spraberry, Sec. 31, Orphan Asylum lands, 2 mi. E Anson, dry, TD 4,056 ft., elev. 1,681 ft.

West-Penn et al 1 Wilkinson Est., Sec. 2, Blk. 15, T&P Sur., 1 mi. N Nugent, dry, TD 1,820 ft.

Montague County: Snuggs & Neal, Inc. 1 Homer Hutson, Sec. 53, MEP&P Sur. A-526, 6 mi. NE Saint Jo, dry, TD 3,700 ft.

Nolan County: C. L. Norseworthy, Jr. 1 Nita Mae Brooks, Sec. 7, Blk. X, T&P Sur., 6 mi. NW Maryneal, dry, TD 7,183 ft., elev. 2,583 ft., Reef 6,200 ft., Ellenburger 7,010 ft.

Shackelford County: A. M. Howsley and B. C. McMordie et al W. C. Godwin, Sec. 18, BAL Sur., 2 mi. SE Albany, dry, TD 911 ft., elev. 1,374 ft.

L. A. Warren Drlg. 1 J. B. Matthews, Sec. 35, BAL Sur., 4 mi. SE Albany, dry, TD 710 ft.

Stephens County: Texo Oil Co. 1 J. R. Coody, Sec. 47, Blk. 5, T&P Sur., 1½ mi. SW Caddo, dry, TD 2,210 ft., no shows.

Taylor County: Lion Oil Co. 1 Bartee, B. Herzog Sur. 1, 1¾ mi. W Shep, dry, TD 6,200 ft., elev. 2,244 ft., Gardner 5,359 ft., Caddo 5,580 ft., Ellenburger 5,750 ft., Hickory 6,170 ft.

Eastern Texas

Woodbine Discovery Well Flows from Open Hole

DALLAS.—On a preliminary test, E. L. Howard and Cooper Herring 1 Odell Clewis, A. Hendley Survey, Woodbine-sand oil discovery in southeastern Anderson County, 10 miles east of Slocum, flowed 13.5 bbl. of oil an hour through ¼-in. choke from 5,285-90 ft. Oil is 38.6° gravity and comes from open hole. TP was 275 psi., and CP 925 psi.

The Woodlawn Pettit gas-distillate pool of northeastern Harrison County was extended 1 mile southwest of Stanolind Oil & Gas Co. and Continental Oil Co. 1 Britton, L. Watkins Survey. The well flowed 3,360,000 cu. ft. of gas daily with distillate content of 40.3 bbl. for 1,000,000 cu. ft. of gas. Production was through perforations in the Pettit from 6,507-70 ft. and 6,555 ft.

A new wildcat for central Wood County is the Hassie Hunt Trust Est. 1 H. O. Hoard, James Brewer Survey, 6 miles east of Mineola. The 6,500-ft. Paluxy-sand test is 660 ft. from the north and east lines of a 700-acre tract.

In Titus County, McMeekin-Kerr 1 E. X. Birdsong will be drilled in the Joseph Meachum Survey on a 265-acre tract, 6 miles south of Mount Pleasant. This is a play for fault-line Woodbine-sand oil production.

Humble Oil & Refining Co. 1 Jewel Burford et al, D. O. Williams Survey A-840, 6 miles southwest of Mabank, Henderson County, was coring from 6,150-77 ft. with no shows.

Sinclair Oil & Gas Co. 1 Ben Curtis, T. J. Stansberry Survey A-823, 10,500-ft. Travis Peak wildcat 4½ miles east and slightly north of Odom, Van Zandt County, was drilling below 8,631 ft.

EAST TEXAS (DISTRICTS 5, 6, AND 6-P) SUCCESSFUL WILDCAT

Panola County: Skelly Oil 1-B Frost Lumber Co., M. Carpenter Sur. A-921, 5 mi. N Joaquin, TD 6,324 ft., flowed 5,200,000 cu. ft. gas a day, Pettit pay 6,066-90 ft.

EAST TEXAS (DISTRICTS 5, 6, AND 6-P) WILDCAT FAILURES

Bosque County: American Liberty Oil 1 Elmer Smith, Israil Patching Sur., 1½ mi. N Walnut Springs, dry, TD 5,718 ft.

Hunt County: E. G. Huggins 1 Paul Mathews, James Cole Sur., 4 mi. W Lone Oak, dry, TD 4,447 ft., elev. 440 ft., Woodbine 2,829 ft., Comanche 3,450 ft.

Texas Gulf Coast

Stewart Well Opens New Pay in Hitchcock Field

HOUSTON.—New pay has been opened in Hitchcock field, Galveston County, at Stewart Petroleum Co. 2 State-Highland Bayou, John D. Moore League. On a 24-hour potential test, the well flowed 40 bbl. of 36.4°-gravity oil daily through a ½-in. choke. Tubing pressure was 1,850 psi. and casing pressure 800 psi.

Gulf South Oil Corp. has run a potential gage on 1 William Niebuhr, et al, new oil discovery well 1 mile southeast of East Mauritz field in Jackson County. Through perforations at 5,736-40 ft., the well flowed 103 bbl. of 33.8°-gravity oil daily through ½-in. choke. The new discovery, which has been named "Wajack," is in the T. M. Dorsett Survey.

Brazos Oil & Gas Co. is continuing to test its 1 State of Texas "O," wildcat 4 miles south of Palacious, in Matagorda Bay. On drill-stem test at 5,164-68 ft. the well flowed at the rate of 7 bbl. of oil per hour, through ½-in. choke, being 2 per cent salt water. Estimated gravity was 31°. Salt-water content gradually increased and the well was squeezed and reperforated in the same interval for another test.

C. N. Housh and American Republics Corp. 1 Pearl Wooten, wildcat test 2½ miles east of Columbus, James Haddon League, Abstract 27, Colorado County, is coring at 8,767 ft. with no shows. Maximum proposed depth on the rank wildcat is 12,000 ft.

In Jackson County, Big Six Drilling Co. has completed a new gas discovery 7½ miles northwest of Edna. The 1 Bishop Griffin, T. Clay Survey, flowed 49,000,000 cu. ft. of gas daily, open flow, through perforations at 2,417-21 ft. Tubing pressure was 1,077 psi.

In the same county, Fred W. Shield opened a new sand in Collier field with completion of 1 W. P. Laughter. The well flowed 13,500,000 cu. ft. of gas daily through perforations at 3,992-4,002 ft. The well is approximately ½ mile south of Collier field.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Hardin County: New oil discovery—Sohio Petroleum Co. B-1 Nona Mills, WC RR Sur. 355, A-519, 5 mi. SW of Kountze townsite, TD 9,212 ft., top pay 7,646 ft., perf. 7,646-52 ft., IP: 101 bbl. oil per day, ½-in. choke, TP 875 psi., 32.6° gravity.

Newton County: Gas-distillate discovery—Callery & Hurt 1-A T. E. Inman et al, Willis Donaho Sur., A-91, 2½ mi. SE Bon Weir, TD 12,215 ft., top pay 10,650 ft., perf. 10,650-70 ft., IP: 296 bbl. condensate per day, plus 1,500,000 cu. ft. of gas, ¼-in. choke, 52° gravity, TP 2,142 psi.

Polk County: New pay at Livingston-Hockley-Humble Oil & Refining Co. 1 D. A. Honaker, A. Viesca Sur., A-77, top pay 3,748 ft., TD 6,744 ft., perf. 3,748-60 ft., IP: 9 bbl. oil per day, ½-in. choke, TP 100 psi., CP 1,040 psi., 32° gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Austin County: J. A. Gray, et al, 1 Bennett Unit, Vital Flores League, Orange Hill area, dry, TD 10,512 ft.

Bee County: D. E. Clark and A. A. Moore 1 O. H. Schelling, William Ryan Sur., A-24, 2 mi. SE of Berclair field, dry, TD 4,025 ft.

Calhoun County: Brazos Oil & Gas Co. 7 Powder Horn Co., Faustina Albarado League, 7½ mi. NW of Port O'Connor, dry, TD 5,700 ft.

DeWitt County: Houston Oil Co. of Texas, and Taylor Refining Co. 1 Felix Koenig, Chas. Linn Survey, A-309, 8 mi. SE of Cuero, dry, TD 8,520 ft.

Goliad County: Smith-Cox & Hawn Bros.

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1 V. T. Irby, Maria de Jesus Y. Brave Sur., 2½ mi. SE of Charco, dry, TP 5,403 ft.

Grimes County: J. E. Smith 1 W. A. Isbell, Sr., R. H. Dunham Sur., ¾ mi. SE of Iola, dry, TD 3,025 ft.

Jackson County: Big Six Drilling Co. 1 Julia Dittrich, R. Gutherie Sur., A-112, 1 mi. N of Cordele field, dry, TD 2,928 ft.

Karnes County: R. L. Kirkwood 1 Vernon Butler, Geo. Elliott Sur., A-101, 1¼ mi. NW of Coy City, dry, TD 7,190 ft.

Live Oak County: H. H. & G. Oil Co. 1 Great Southern Life Ins. Co., et al, Dr. Simmons Subd., E. Arnold Sur., 10 mi. SW of Three Rivers, dry, TD 2,200 ft.

Newton County: The Texas Co. 1 Sud West, Jr., Seth Swift Sur., A-379, dry, TD 11,475 ft.

Refugio County: H. R. Smith, John C. Orgain, and F. William Carr 1 W. H. Messer, Johnson & Pugh Subdn. of Bonnie View ranch, 5 mi. SE of Woodsboro, dry, TD 6,515 ft.

H. R. Smith, John C. Orgain & F. William Carr 1 Leo Veselka, Johnson & Pugh Subdn. of Bonnie View ranch, 10 mi. SE of Woodsboro, dry, TD 6,515 ft.

Wharton County: J. S. & R. H. Abercrombie 1 Guy F. Stovall, et al, T. W. Herd Sec. 24, A-466, S of Louise, dry, TD 7,381 ft.

Mississippi

Alabama Deep Test Has Only Slight Oil Shows

JACKSON.—In Clarke County, Alabama, Danciger Oil & Refining Co. 1 John F. York, NE SE 1-7n-1w, is coring at 11,617-67 ft. This test encountered first Anhydrite stringer at 11,352 ft. Below this point cores have been predominately hard dense limestone with streaks of shale and anhydrite. No porosity or permeability has been encountered. A very slight show of oil was noted in 4½ ft. of gray, dense, slightly fossiliferous lime at 11,582-86½ ft.

In Russum field, approximately ½ mile west of the field discovery well, Roeser & Pendleton 1 Lambert Huff, 17-10n-2e, Jefferson County, Mississippi, ran electric log to total depth of 10,016 ft. Sidewall sampling gun was lost in the hole and at last report operators were fishing for the gun prior to abandoning the hole. Only sand encountered in the Lower Tuscaloosa which had any permeability was at 9,740-48 ft. and only 4 ft. of this was considered to be possibly productive. A drill-stem test was run of this section and recovery was 150 ft. of oil and recorded bottom-hole flowing pressure was 1,025 psi. The stringer sand which was developed at 9,768-75 ft. in the discovery well was shaled out in the 1 Huff.

Danciger Oil & Refining Co. and William Helis 2 George Armstrong, 20-5n-2w, northeast of Sibley field, Adams County, is still having completion troubles. Operators ran drill-stem test of the Parker zone of the Wilcox at 6,436-39 ft. with no recovery. These perforations were squeezed prior to attempting another drill-stem test in the same zone.

The second producer for West Lincoln field, Lincoln County, Mississippi, was completed on pump during the past week. Lion Oil Co. 1 M. E. Allred, NW SW 23-6n-6e, pumped 53 bbl. of 40°-gravity oil per day plus 12 bbl. of salt water in 24 hours. Production is through perforations at 10,659½-69½ ft. in the Lower Tuscaloosa stringer sand. This is a south offset to the field discovery well.

MISSISSIPPI WILDCAT FAILURE

Jefferson County: Kemp Drilling Co. and Peterson Drilling Co. 1 S. & H. L. Cohn, 25-10n-1e, dry, TD 6,003 ft.

Oklahoma

Morrow Sand Shows Gas In Ellis County Wildcat

SINCLAIR OIL & GAS CO. has encountered fairly strong gas showings in its 1 Berry, C SE NW 14-24n-25w, a rank wildcat in northwestern Ellis County, in the northwestern part of the state. Showings were in the Morrow sand, top of which was checked at 7,905 ft.

A 15-minute drill-stem test taking in an interval at 7,956-77 ft. got a strong air blow, and in the pipe break-down following the test there was 1,530 ft. of gas-cut mud. With hole deepened to 8,015 ft., another test was made, taking in the section below 7,965 ft. Tester was open 90 minutes, during which there was a good blow. At the end of the test there was 810 ft. of gas-cut mud in the pipe.

Although no information has been released by the operator, Peppers Refining Co. is believed to have made what may prove to be an important oil discovery at its 1 Smith, NW SW SE 4-2n-8w, 5 miles northwest of Marlow, in northwestern Stephens County. Observers estimate the total depth of the well at 7,198 ft. and report that casing is being run. The well had an oil flow, estimated at the rate of about 20 bbl. per hour in a drill-stem test in what is believed to have been the Hoxbar section, where a saturated sand was reported logged at 6,696-6,739 ft. Another possible pay sand around 7,096 ft. also is reported.

Nearest other production is in the West Marlow pool, about 4 miles to the south. The Northwest Marlow pool is about the same distance to the east.

In southeastern Stephens County, an outpost test in the area southeast of the Velma pool, west of the northwest end of the Camp pool, and north of the Milroy pool, is showing for a good producer in several prospective pay sands. It is Sinclair Oil & Gas Co. 1 Arnett, NW SE NE 3-2s-4w. Good saturation was logged in a sand at 5,445-77 ft., where a drill-stem test resulted in a recovery of 2,040 ft. of oil. Additional oil showings were obtained in a drill-stem test of a sand at 5,805-60 ft. In a drill-stem test of a still lower zone at 5,920-70 ft., gas was at the surface within 10 minutes, flowing at the rate of 130,000 cu. ft. per day, and while pipe was being pulled after the test, the well started to unload. Hole is being cored ahead.

W. H. Pine 1 Wright, SW SW NW 23-5n-4e, a mile north of production at the west end of the Bebee pool, northwestern Pontotoc County, yielded 510 ft. of clean oil and 990 ft. of mud-cut oil in a drill-stem test at 2,568-88 ft. in Hunton lime, topped at 2,535 ft. The well had a good showing of gas during the test with gas at the surface within 33 minutes after the tester was opened. Tool was open 90 minutes. Since the test, hole has been drilled to 2,953 ft. in Simpson dolomite, the original objective. This formation was found dry, and casing has been run only through the Hunton. The string was landed at 2,603 ft. and will be perforated in that zone.

OKLAHOMA SUCCESSFUL WILDCATS

McClain County: Greenbriar Oil Co. 1 Weintzel, NE NW NW 33-8n-3w, elev. 1,250 ft., flowed 333 bbl. of 44.4°-gravity oil per day from bromide at 10,690-10,726 ft., TD 11,595 ft., Tonkawa 6,190 ft., Avant 6,490 ft., Hogshooter 7,000 ft., Checkerboard 7,250 ft., first Deese 7,724 ft., second and third Deese not developed, broken fourth Deese 8,364 ft., no fifth Deese, sixth Deese 8,758 ft., seventh Deese 8,950 ft., sand 9,135 ft., 9,153 ft., and 9,164 ft., Mississippian 9,423 ft., Woodford 9,543 ft., Chimney Hill 10,275 ft., Sylvan 10,282 ft., Viola 10,350 ft., Ferndale Viola 10,395 ft., Trenton Viola 10,420 ft., dolomite 10,596 ft., sandy dolomite 10,641 ft., first bromide 10,665 ft., sand 10,666 ft., Tulip Creek 10,982 ft., McLish 11,115 ft., first Oil Creek 11,212 ft., second Oil Creek 11,247 ft., Joins sand (with pay shut in—went to salt water) 11,467 ft.

Oklahoma County: Peppers Refining 1 Wegener, NW NW NW 23-12n-2w, 2 mi. S Munger, elev. 1,210 ft., pumped 45 bbl. of oil per day from Hunton at 6,388-6,404 ft., TD 6,620 ft., Hogshooter 5,142 ft., Checkerboard 5,448 ft., conglomerate 5,592 ft., Oswego 6,014 ft., Verdigris 6,176 ft., Red Fork 6,268 ft., unconformity 6,456 ft., Bois d'Arc 6,372 ft., Haragan 6,405 ft., Sylvan 6,605 ft.

Payne County: ¾-mi. NW extension to W. Norfolk—Blackwell & Mulberry 3 Taylor, NE NE NE 5-18n-5e, est. elev. 825 pumped 26 bbl. of 42°-gravity oil per day from Peru at 2,875-96 ft., TD 3,353 ft., Layton 2,200 ft., conglomerate 2,560 ft., Checkerboard 2,528 ft., Prue 3,060 ft., Skinner 3,190 ft., lime 3,203 ft., Red Fork 3,248 ft., no Bartlesville.

Seminole County: S extension to Dora—Anderson-Prichard 1-A Bowles, NE NW NW 10-6n-6e, elev. 901 ft., pumped approx. 80 bbl. of oil per day from Senora sand at 2,259-72 ft., TD 3,991 ft., Earlsboro lime 2,278 ft., Earlsboro sand 2,410 ft., Union Valley 2,728 ft., Wapanucka sandy lime 2,794 ft., Cromwell 2,828 ft., Mayes 3,304 ft., Woodford 3,408 ft., Misener 3,554 ft., Sylvan 3,560 ft., Viola 3,633 ft., dense 3,676 ft., dolomite 3,724 ft., sandy dolomite 3,795 ft., Wilcox 3,884 ft., second Wilcox 3,926 ft., dolomite 3,955 ft., sand 3,980 ft.

Stephens County: Big Chief Drilling 1 Harley, SW SW NW 8-2s-6w, Palacine area, elev. 1,080 ft., pumped 61 bbl. of 34°-gravity oil per day from Harley sand at 3,162-81 ft., TD 3,862 ft., Loco lime 2,270 ft., sand 3,087 ft., 3,161 ft., and 3,186 ft., Arbuckle detrital 3,466 ft., Arbuckle lime 3,780 ft.

OKLAHOMA WILDCAT FAILURES

Carter County: Mid-Continent et al 1 Cummings, SE SW NE 2-5s-1w, elev. 893 ft., dry, TD 5,182 ft., Norris 4,395 ft., Norris sand 4,445 ft., sand 4,647 ft., Lone Grove sand 4,835 ft., second Lone Grove sand 4,900 ft.

Creek County: Falcon-Seaboard Drilling 1 Edminston, NW SW NW 3-16n-10e, S. Kelleyville dist., elev. 864 ft., dry, TD 2,754 ft., Checkerboard 1,036 ft., conglomerate 1,047 ft., Oswego 1,601 ft., Prue 1,667 ft., Verdigris 1,864 ft., Skinner 1,873 ft., lime 2,077 ft., Red Fork 2,082 ft., Bartlesville 2,220 ft., Bartlesville sand 2,290 ft., lime 2,398 ft., upper Booch 2,467 ft., Gilcrease 2,593 ft., Pitkin 2,747 ft.

Grant County: Roberts 1 Johnson, SW SE NW 14-27n-3w, ½ mi. N Deer Creek, elev. 1,088 ft., dry, TD 4,451 ft., Layton 3,488 ft., Oswego 3,770 ft., Mississippi lime 4,135 ft.

Hughes County: Thomas Oliphant et al 1 Knight, SE SE SE 12-8n-8e, ¾ mi. E Benjamin, elev. 795 ft., dry, TD 3,535 ft., lime 2,670 ft., Booch 2,838 ft., Gilcrease 3,030 ft., Gilcrease sand 3,051 ft., no Union Valley, Cromwell 3,330 ft., Mississippian Caney 3,520 ft.

Jackson County: Stuenkel & Treadwell 1 Campbell, NE NW NW 31-2n-18w, elev. 1,339 ft., dry, TD 2,030 ft., granite wash 859 ft.

Jefferson County: Richardson 1 Byram, NW NE SE 26-3s-4w, 1¼ mi. NW Healdton, dry, TD 3,186 ft., basal Pennsylvanian-basal Hunton 2,990 ft.

Noble County: Harper-Turner, Bishop, and Lynn Drilling Co. 1 Cress, NE NE SE 4-21n-1e, 3 mi. S Otoe City, elev. 1,028 ft., dry, TD 5,034 ft., Tonkawa 2,480 ft., Avant 2,991 ft., Perry 3,052 ft., Layton 3,394 ft., lower Layton 3,603 ft., Oswego 4,013 ft., Mississippi lime 4,590 ft., Woodford 4,834 ft., Misener 4,894 ft., dense 4,899 ft., Wilcox 4,968 ft., second Wilcox 5,008 ft.

Okfuskee County: Davidor & Davidor 1 Cowan, NW NW NW 13-10n-9e, ¾ mi. S Okemah, elev. 822 ft., dry, TD 4,195 ft., Gilcrease 2,950 ft., Gilcrease sand 2,953 ft., second Gilcrease 3,003 ft.,

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Cromwell 3,347 ft., Hunton 3,898 ft., Sylvan 4,010 ft., Wilcox 4,168 ft.

Oklahoma County: Peppers Refining 1 Voss, NE NE SW 3-12n-3w, ⅝ mi. E of S. Britton, elev. 1,153 ft., dry, TD 7,315 ft., Hogshooter 5,420 ft., Checkerboard 5,620 ft., conglomerate 5,790 ft., Oswego 6,190 ft., Verdigris 6,360 ft., Bois d'Arc 6,600 ft., Haragan 6,630 (?) ft., Sylvan 6,890 ft., Fernvale 7,020 ft., dense 7,065 ft., Wilcox 7,200 (?) ft., second Wilcox 7,290 ft.

Stephens County: Sherrod & Apperson 1 Pettigrew, SE SE NE 8-2s-7w, elev. 1,013 ft., dry, TD 4,205 ft., conglomerate 3,885 ft., basal Pennsylvanian-Simpson 4,080 ft.

Tillman County: Johnson 1 Wynn, SE SE NE 36-2s-16w, approx. 9 mi. E Frederick, elev. 1,105 ft., dry, TD 4,105 ft., Canyon 3,346 ft.

Aairways Oklahoma Petroleum Corp. 1 State, SW NW NW 35-1s-18w, elev. 1,362 ft., dry, TD 4,321 ft., Canyon 3,190 ft., Arbuckle 4,105 (?) ft.

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United Fuel Gets Gas Well in Wood County

PITTSBURGH.—In Leidy Township, Clinton County, Pennsylvania, C. E. Fralich et al 1 Wm. H. Summerson, elevation 1,292 ft., was completed gaging 3,800,000 cu. ft. of gas, 4,000 psi. rock pressure in 17 hours. The Onondaga lime was at 6,281 ft., Oriskany sand 6,294 ft., gas 6,295 ft., total depth 6,301 ft. In Shippen Township, Cameron County, Sylvania Corp. and New York State Natural Gas Corp. located 1 Hercules Powder Co., wildcat, elevation 1,187 ft. It is on the Colegrove quadrangle 5.75 miles south of Lat. 41°, 35′ and 1 mile west of Long. 78°, 15′. This well is on the Emporium structure which has never before been drilled. Napier Township, Bedford County, South Penn et al-Snee & Eberly 1 Jesse B. Miller, elevation 1,666 ft., is drilling at 7,603 ft. Unity Township, Westmoreland County, Peoples Natural Gas Co. 1-3921 Fred Musnug, elevation 2,100 ft., is drilling at 5,279 ft.

An Oriskany sand test was completed in the Limestone Hill area, Steele district, Wood County, West Virginia-United Fuel Gas Co. 6588 L. E. Blair, elevation 863 ft., resulted in 2,926,000 cu. ft. of gas, after shot, 44-hour rock pressure 645 psi., Corniferous lime 5,022 ft., Oriskany sand 5,144 ft., gas 5,156-64 ft., total depth 5,166 ft. Two good shallow-sand gas wells were noted: Big Creek district, McDowell County, United Fuel Gas Co. 2-6560 New River & Pocahontas Consolidated Coal Co., gaged 1,679,000 cu. ft. of gas, Berea sand, total depth 4,230 ft.; Trap Hill district, Raleigh County, Columbian Carbon Co. B-7-GW-1147 C. C. Dickinson, gaged 1,309,000 cu. ft. of gas, Ravencliff sand, total depth 1,504 ft.

There were 7 new locations reported in southwest Pennsylvania and 33 in West Virginia.

WEST VIRGINIA SUCCESSFUL WILDCAT

Wood County, Steele district, United Fuel Gas Co. 6588 L. E. Blair, elev. 863 ft., 2,926,000 cu. ft. gas, after shot, 44-hour rock pressure 645 psi., Corniferous lime 5,002 ft., Oriskany sand 5,144 ft., gas 5,156-64 ft., TD 5,166 ft.

Michigan

Allegan County May Have New Traverse Discovery

MOUNT PLEASANT.—A possible new Traverse oil discovery loomed for Allegan County at James J. McGerry, Trustee, 1 Smith, NW NW NW 9-1n-12w, Otsego Township wildcat, which showed 75 ft. or more of free oil, natural, from the Traverse and was being prepared for acid treatment early this week, after 5-in. casing had been run and cemented at 1,410 ft.

Traverse lime at the 1 Smith was logged at 1,454 ft., pay at 1,456½-57 ft., and hole was bottomed out for test at that point. No water was reported showing at the well's present depth.

This is the second wildcat test to be drilled by McGerry this summer in the Otsego area. In July he drilled and tested the 1 Brooks, SE NW SE 5-1n-12w, located about ½ mile to the northwest of the 1 Smith. The first test carried about four bailers of oil and eight bailers of water from the Traverse in 13 hours after plugback to 1,440 ft. from 1,441 ft. This well failed to show for commercial completion.

E. V. Hillard's 1 Bay Trust & Castle, NW NW NW 23-16n-31, Garfield Township wildcat, Bay County, was reported to be pumping and flowing about 7 to 8 bbl. of fluid an hour from the Dundee on 8-hour days after pay was acidized with 2,500 gal. A small water cut was showing.

A wildcat located about 8 miles northwest of the large Kawkawlin Dundee oil pool, Bay County, logged Dundee top at 3,199 ft. and was drilled to 3,354 ft., total depth. Hole was plugged back to 3,337 ft., in an attempt to shut off water, before pay was acidized. A pump unit was scheduled to be set for further tests.

MICHIGAN WILDCAT FAILURES

Allegan County, Fillmore Township: George F. Lister 1 Timmerman, NW SW SW

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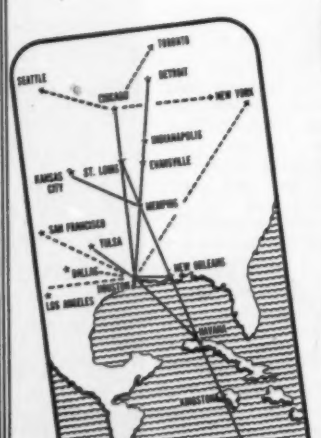

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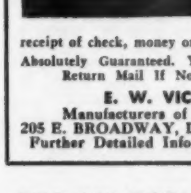

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Further Detailed Information Upon Request

13-4n-15w, Traverse 1,622 ft., dry, TD 1,656 ft.

Clinton County, Ovid Township: Mercer Oil Co., Inc., 1 Baker et al, NW NW NE 10-7n-1w, Marshall 672 ft., dry, TD 690 ft.

Ionia County, North Plains Township: Empire Petroleum Co. 1 DePue, SW NW NW 1-8n-5w, Dundee 2,993 ft., dry, TD 3,060 ft.

Newaygo County, Troy Township: M. B. Belden 3 Belden & Fawcett, NE NE SE 33-16n-14, Traverse 2,170 ft., dry, TD 2,179 ft.

Van Buren County, Geneva Township: Cook Drilling Co. & Arthur J. Gilmore 1 Hammond, SW SW NE 1-1s-16w, Traverse 1,155 ft., dry, TD 1,157 ft.

Louisiana-Arkansas

Casing Being Run in Bienville Wildcat Well

SHREVEPORT.—E. C. Cook et al 1 W. C. Locke, 9-15n-10w, wildcat 4 miles south of Bistineau gas field, Bienville Parish, ran a 30-minute drill-stem test of the Paluxy from 2,792-2,800 ft., total depth, using ¼-in. choke. Recovery was 120 ft. of 42.5°-gravity oil and 20 ft. of mud. No salt water was noted. Paluxy was topped at 2,756 ft. Elevation is 185 ft. Operators are running casing.

J. D. Collins et al 1 Caplis, 33-16n-12w, wildcat 2 miles west of Elm Grove field, Caddo Parish, was drilled to 4,562 ft. in the Rodessa. Operators acidized open hole from 4,506-62 ft. with 1,000 gal. and swabbed acid water with slight show of gas. The well is being tested.

Continental Oil Co. 1 P. C. Wideman, 21-21n-7w, Claiborne Parish, was coring at 7,858 ft. in the Cotton Valley. Core from 7,723-73 ft. recovered shale and hard sand with a very slight show of oil.

Stanolind Oil & Gas Co. 1 G. W. Meadors, 8-22n-5w, wildcat 3 miles southeast of Colquitt, Claiborne Parish, was reaming down at 11,065 ft. in the Smackover. Core from 10,920-11,065 ft. recovered dense crystalline lime with no shows.

Carnes & May 1 Clark, 7-15n-8e, wildcat 10 miles southwest of Delhi in Franklin Parish, with total depth of 4,410 ft. in the Paluxy zone, acidized from 3,851-56 ft. with 500 gal. and swabbed oil and salt water. Operators are testing.

Grace Drilling Co. 1 Southern Advance Paper Co., 33-8n-10w, 6 miles northeast of Many in Sabine Parish, was drilling below 4,866 ft. in sand and shale.

Southwest Gas Production et al 1 Colvin, 8-21n-2w, wildcat 3 miles east of Bernice, Union Parish, was drilling below 7,021 ft. in shale.

In Arkansas, C. H. Murphy et al 1 Concannon, 29-19s-18w, northwest diagonal offset to the discovery well in Tubal field of Columbia County, was coring below 9,326 ft. in the Smackover, topped at 9,281 ft. A 15-minute drill-stem test from 9,289-93 ft. recovered water cushion cut with gas. No top pressure was recorded.

Lion Oil Co. 1 Olivia, NE SW 18-17s-24w, Smackover wildcat in Lafayette County, north of Patton field, was drilling below 8,280 ft. Cotton Valley was topped at 6,950 ft.

In Union County, T. L. James & Co., Inc. 1 Clark heirs, 30-19s-12w, 10 miles south Urbana field, pumped 1½ bbl. of oil a day from open hole. It is dry at 2,339 ft. in the Nacatoch.

Marine Oil Co. 1 Whited 1-18s-13e, is a new discovery 2 miles northeast of Urbana field, Union Parish. It was drilled to 5,000 ft., plugged back to 2,400 ft., Nacatoch, and pumped 6 bbl. a day of oil from open hole from 2,337-2,400 ft.

NORTH LOUISIANA SUCCESSFUL WILDCAT

Lincoln Parish: Southwest Gas Prod. Co. 1

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Josie M. Colvin, 15-19n-2w, TD 9,077 ft., flowed 79 bbl. 59°-gravity distillate a day through ½-in. choke, Vaughn pay 8,840-56 ft., TP 3,313 psi., CP 3,350 psi., GOR 53,500 cu. ft.

NORTH LOUISIANA WILDCAT FAILURES

Concordia Parish: Kemp Drlg. Co. 1 Engle-Lamb, 3-8n-8e, dry, TD 6,005 ft.

Richland Parish: Duerr & Bolin Co. 1 H. P. Jones, 24-15n-6e, dry, TD 3,607 ft., elev. 70 ft., Tuscaloosa 2,750 ft., Paluxy 3,490 ft., Travis Peak 3,603 ft.

ARKANSAS WILDCAT FAILURES

Columbia County: C. H. Murphy & Co. 1 Emon, 20-18s-18w, 3 mi. S Spottsville, dry, TD 8,384 ft. in Smackover.

Lafayette County: Austin Petroleum Corp. 1 Ellis, 15-16s-23w, midway between Buckner and Lewisville fields, dry, TD 4,673 ft., elev. 328 ft., Kilpatrick 3,968 ft., James 4,317 ft., Travis Peak 4,646 ft.

Permian Basin

Kent County Outpost Gets Encouraging Show

MIDLAND.—Kewanee Oil Co. 2-D Wil, Section 3, Block 4, H&GN Survey, ¾ mile northwest outpost to 1-C Wil, Pennsylvanian-lime discovery in southwestern Kent County, was coring deeper after getting an encouraging show on a 60-minute drill-stem test from 6,935-60 ft. Recovery was 1,080 ft. of gas in the drill pipe, 50 ft. of free oil, and 240 ft. of heavily oil and gas-cut mud with no water. On a previous test from 6,875-6,910 ft., it recovered 35 ft. of mud cut with oil and gas. Kewanee 1-D Wil, north offset to the discovery and also in Section 3, is bottomed at 7,056 ft., where 5½-in. casing is being set for completion opposite the reef, topped at 6,850 ft.

Drilling & Exploration 1-D Connell, Section 5, Block 5, H&GN Survey, over 1 mile west of the Kewanee wells, topped the Pennsylvanian lime at 7,072 ft. There was a slight stain from 7,080-85 ft. The well has apparently missed the reef and the lime which Kewanee 1-C Wil and 1-D Wil encountered.

Union Oil Co. of California has taken production tests on its 1 Laura Cotten, Section 91, Block T, D&W Survey, Canyon-reef-lime discovery 4½ miles southeast of Brownfield in Terry County. It has perforated pipe between 9,998-10,073 ft. with four shots per foot. The first hour the well made an estimated 70 bbl. of oil. Union is moving in for a south offset, 1 Christova-Stitt.

General American Oil Co. 1 Ben Winkleman, Section 18, Block 37, T-3-S, T&P Survey, 1¼ miles southwest of production in Tex-Harvey field, Midland County, topped the Spraberry-sand section at 7,155 ft. Operator drilled to 7,161 ft., total depth, and was setting casing. Elevation is 2,627 ft. There have been no shows to this point. Structurally it is estimated to be about 55 ft. lower than Phillips Petroleum Co.'s nearest well in the Tex-Harvey area.

Humble Oil & Refining Co. 1 Midkiff, Section 46, Block 38, T-4-S, T&P Survey, 24 miles southeast of Midland, has cemented pipe at 7,285 ft. above top of the Spraberry which showed oil and gas on drill-stem test. Operator will try for completion in the Spraberry. Started as an Ellenburger well, it topped Spraberry at 7,300 ft. Elevation is 2,771 ft. This top is approximately 115 ft. lower than top of Spraberry in the highest well in Tex-Harvey field.

Garrett M. Smith 1 Hall, Section 8, Block A-29, Public School lands, 9 miles west of Union pool, northwestern Andrews County, on a 60-minute drill-stem test from 7,080-7,180 ft. had a fair air blow and recovered 751 ft. of slightly gas-cut mud with rainbow show of oil. It was drilling below 7,275 ft. Anderson-Prichard Oil Corp. and Stanolind Oil & Gas Co. 1-H-15 Fasken, Section 15, Block 41, T-2-N, G&MMB&A Survey, wildcat 4½ miles east of Midland Farms pool, was waiting on orders at 4,900 ft. A 60-minute drill-stem test of the Grayburg from 4,830-4,900 ft. recovered 30 ft. of slightly oil-and-gas cut mud and 120 ft. of black sulfur water.

In Upton County, Cities Service Oil Co. and Continental Oil Co. will drill a 13,000-ft. wildcat to test the Ellenburger 6 miles south of Benedum field. The well will be 1 University, 1,980 ft. from the east line and 660 ft. from the south line of Section 29, Block 3, University Lands. In Terry County on a block farmed out by Magnolia Petroleum Co., C. L. Norsworthy, Jr., has let contract to M. J. Delaney, Inc., to drill a 10,500-ft. Pennsylvanian wildcat northwest of Brownfield and about 10 miles northwest of Union 1 Cotten, reef discovery. The well will be in SE SE of Section 8, Block D-12, ELRR Survey.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Borden County: Nelson Bunker Hunt 1 Jerry B. Clayton, Sec. 42, Blk. 32, T-4-n, T&P Sur., 10 mi. SW Gail, 1¼ mi. E and slightly N Good field discovery well, dry, TD 10,200 ft., elev. 2,529 ft., Reef 8,165 ft., Ellenburger 10,060 ft.

Crosby County: Deep Rock Oil Corp. and Hancock Oil 1 Morgan Jones, Sec. 114, Blk. 8, H&GN Sur., 12 mi. S Crosbyton, dry, TD 8,761 ft., elev. 2,723 ft., Clearfork 3,330 ft., Strawn 7,900 ft., Tubb 4,050 ft., Mississippian 8,360 ft., Ellenburger 8,730 ft.

Ector County: John R. Less et al 1 Paul Moss, Sec. 34, Blk. 44, T-2-s, T&P Sur., 1 mi. S Harper field, dry, TD 5,805 ft., elev. 3,105 ft.

Phillips Pet. Co. 1-HH TXL, Sec. 17, Blk. 46, T-1-s, T&P Sur., 1 mi. E Wheeler Deep field, separated from field by 3 Devonian dry holes, dry, TD 9,813 ft., elev. 3,103 ft., San Andres 4,300 ft.

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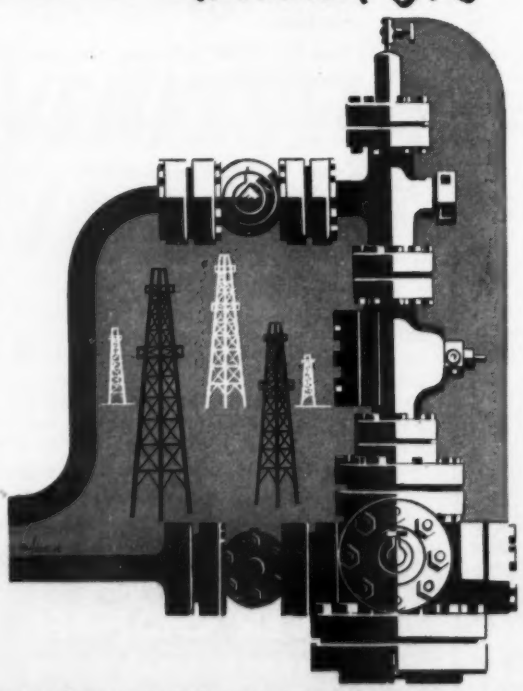

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Garza County: S. W. Sibley & Co. 1 Connell, Sec. 85, Blk. 5, GH&H Sur., 6 mi. E Post, dry, TD 3,130 ft., elev. 2,504 ft.

King County: Continental Oil 1 Mary A. Martin, Sec. 167, Blk. F, H&TC Sur., 12 mi. SW Guthrie, dry, TD 7,201 ft., elev. 1,842 ft., Canyon Reef 4,778 ft., Caddo 6,254 ft., Mississippian 6,381 ft., Ellenburger 6,789 ft., granite 7,173 ft.

Yoakum County: Geo. P. Livermore, Inc. 1 A. M. Brownfield, Sec. 15, Blk. D, J. H. Gibson Sur., 13 mi. NE Plains, 2¼ mi. SW Alex San Andres field, dry, TD 8,312 ft., elev 3,556 ft., San Andres 4,530 ft., Glorietta 5,940 ft.

PANHANDLE WILDCAT FAILURE

Ochiltree County: Sinclair Oil & Gas 1 Harbaugh, Sec. 141, Blk. 13, T&NO Sur., 1½ mi. N Lips field, dry, in Lower Pennsylvanian, TD 8,810 ft., elev. 2,970 ft., Douglas 2,970 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Amerada Petroleum Corp. 1-S-A State, 35-14s-33e, 1½ miles northeast of Gulf Oil Corp. 1 Maud Saunders, Pennsylvanian discovery in the northwest part of Lea County, showed for additional pay in the Permo-Pennsylvanian on a 4-hour drill-stem test from 9,995-10,000 ft. Gas was at the surface in 4 minutes. The well did not flow and final recovery was 9,486 ft. of 40.5°-gravity oil, 270 ft. of salt water, and 180 ft. of oil-and-gas-cut mud.

Magnolia Petroleum Co. 1-Z State, 36-7s-29e, 1½-mile northwest outpost to the company's discovery in the recently opened Lightcap pool, eastern Chaves County, made a 3-hour drill-stem test from 7,346-64 ft. There was gas at the surface in 29 minutes. Recovery was 190 ft. of mud, gas cut, 180 ft. of mud cut with oil and gas, 130 ft. of mud, and 50 ft. of salt water. On a later drill-stem test from 7,417-26 ft., open 2 hours, 30 ft. of mud and 360 ft. of salt water was recovered. It is coring ahead at 7,526 ft. in lime.

Stanolind Oil & Gas Co. 3 South Mattix, 22-24s-37e, assured Silurian production for Fowler Ellenburger pool of southeastern Lea. It is ¾ mile south of Stanolind's Ellenburger discovery in the pool. On a 4½-hour drill-stem test from 7,695-7,745 ft., gas was at the surface in 1 hour. Oil followed and the well flowed into pits for 85 minutes. Turned into tanks, it flowed 37 bbl. of oil the first hour and 35 bbl. the second hour. Drilling continued below 7,750 ft. in lime.

Canadian Fields

Lower Cretaceous Success Also Has Devonian Promise

CALGARY.—This week Central Leduc Oils, Ltd., Calgary independent, struck oil in Lower Cretaceous sands at Central-Wild 1, LSD 12, 27-52-26w4, a mile north of the Imperial-Stony Plain 1 (D3 discovery well) and 2¼ miles southwest of Cal-Standard Acheson (D3 Devonian oil strike). Central's well drew 2,800 ft. of light crude oil plus 630 ft. of salt water in 1 hour drill-stem test of a 15-ft. sand zone above 4,200 ft. The indicated commercial discovery of Cretaceous oil may not be all for Central-Wild. The well is logging in elevation between Stony Plain and Acheson and is considered to be a good prospect for Devonian production on the reef tapped by the Imperial and Cal-Standard wells. Central's well is now below 4,300 ft. heading for the Devonian.

Socony-Vacuum Exploration Co. recorded a D2 zone Devonian oil discovery 12 miles southwest of Camrose in central Alberta, and during the coming week its test well is expected to get an answer on D3 zone prospects. The discovery well is Socony-Flint 1, in LSD 13, 17-45-21w4. Location is 40 miles southeast of Leduc-Woodbend Devonian field, 65 miles south of Redwater Devonian field, and 45 miles north of Stettler Devonian field. The D2 pay zone was topped about 4,505 ft., and between 30-35 ft. of highly productive pay was cored and tested before water line was reached. Drill-stem tests of the sections of the pay gave flows of 34°-gravity light crude at rates from 575 to 700 bbl. daily. At last report coring was proceeding at 4,690 ft., with the D3 zone expected shortly.

The Acheson-Stony Plain area, a few miles north of Leduc-Woodbend field and 7 miles west of Edmonton city, began to look like the start of a major D3 Devonian reef field, with good prospects also for the D2 Cretaceous zone.

The California-Standard Co.'s Acheson-Province 1 well, LSD 13, 2-53-26w4, continued coring and testing the D3 zone and opened up 101 ft. of pay zone. Separately tested intervals yielded flows of 36.5°-gravity light crude at rates ranging from 700-1,500 bbl. daily. The interval so far opened extends from 4,969-5,070 ft., with base of pay not yet established. The well topped the D3 about 122 ft. higher than Imperial Oil's Stony Plain 1, located almost 4 miles south-southwest, which recently tapped about 6 ft. of oil pay above the water line. If, as believed probable, the reef is continuous, Acheson may find from 125-130 ft. of pay above water.

Twenty-two more wells were completed in Alberta: 16 oil and 6 failures. Total completions for the year now stands at 610 wells: 459 oil producers, 25 gas wells, and 126 failures.

CANADIAN UNSUCCESSFUL WILDCATS

Canadian Fina-et al.-Brownfield 1, LSD 12, 16-38-11w4, TD 3,799 ft.

Albercan-Western Prairie-Fina 1, LSD 13, 28-41-12w4, TD 3,475 ft.

Texaco-Lamont 1, LSD 1, 30-55-18w4, TD 3,770 ft.

Great West-Laguerre-Chapman 1, LSD 3, 3-38-21w4, TD 6,000 ft.

South Louisiana

Tide Water Testing High-Pressure Jefferson Well

NEW ORLEANS.—Although results have not been too promising, Richardson & Bass continues to test its St. Bernard Parish wildcat, 1-G Albert Ruiz, 136-14s-14e, 7 miles southeast of Kenilworth field. Operators perforated 12,862-88 ft. and recovered salt water. Well was reperforated at 12,052-92 ft. but failed to get penetration and perforations were squeezed off. Operator is now waiting on cement to reperforate the same interval.

Meanwhile, the same operator is drilling below 13,400 ft. in its Cox Bay area wildcat, 1-H State Lease 1,794, 4-18s-16e, Plaquemines Parish. The well has 9⅝-in. casing set at 10,896 ft.

Tide Water Associated Oil Co. has gaged a flow of 120 bbl. of 45.3°-gravity oil daily in its high-pressure well in Manila Village field of Jefferson Parish. The same high pressure, reported around 9,500 psi., prevailed while the well was cleaning and no drop was recorded. Although no particular trouble has been experienced, the operator is being particularly cautious with the high-pressure job. On the initial test, the well had a gas-oil ratio of 20,900 to 1, and a flow of 2,508,000 cu. ft. of gas daily.

Humble Oil & Refining Co. has been issued permit to drill an 11,000-ft. wildcat in the now dry Livingston Parish. The well will be drilled approximately 7½ miles north and east of the old Sorrento dome where shallow production is being taken by The Texas Co. It will be 1 Alcus Land Corp., 9-9s-5e.

SOUTH LOUISIANA WILDCAT FAILURES

Pointe Coupee Parish: Progress Petroleum, Inc., 1 Nicholson, 86-6s-9e, 2 mi. N and 2½ mi. W of Maringouin townsite, dry, TD 9,405 ft.

St. Mary Parish: Atlantic Refining Co. 1 Homer Gonsoulin, 68-13s-8e, 1 mi. S and 3 mi. E of Jeanerette, dry, TD 7,514 ft.

Illinois-Ind.-Ky.

Henderson Wildcat Gets Oil Flow From McClosky

EITHER a new pool or a long extension for the Zion pool in Henderson County, western Kentucky, appears to have been uncovered by Hunt & Hume and associates at their 1 Pinkston-Blair, NW SW SW 2-P-25. In McClosky lime, topped at 2,158 ft., the well flowed clean oil during a drill-stem test. The test took in an interval at 2,162-69 ft. Tool was open 60 minutes. Gas was at the surface within 5 minutes. Hole has been drilled to 2,180 ft. and casing cemented on bottom for completion. Previously, the well had shown for possible production from the Aux Vases, in which a 60-minute drill-stem test recovered 30 ft. of clean oil, 50 ft. of oil-cut mud, and 10 ft. of salty mud. The location is about 1¾ miles southeast of present limits of the Zion pool.

C. R. Craft 1 Beasley, SE SE 7-Q-26, another promising discovery well in the same county, swabbed at the rate of 2 to 3 bbl. of oil per hour while cleaning out. Bottom is in Aux Vases saturation at 1880-1,905 ft. Pay has not been shot. This area is about 2 miles northeast of Spottsville and about 10 miles northeast of Henderson, in the northeastern part of the county. It is about a mile from nearest production.

In Indiana, Carter Oil Co. has completed its 1 Drake, NW SE SE 14-9n-10w, Sullivan County, pumping 180 bbl. of oil daily from Devonian lime, opposite which casing was perforated from 2,141 to 2,252 ft. The area, 4 miles northwest of Shelburn, is about 2 miles west of the Dome pool, nearest production.

Noah Petroleum Co. 2 Mumford, NW NW NW 27-3s-13w, 8 miles southwest of Owensville, Gibson County, Indiana, pumped 75 bbl. of oil per day at completion after being deepened 3 ft. in its Cypress sand pay zone at a total depth of 2,444 ft. Top of saturated sand is 2,435 ft. Nearest production is in the East Griffin area, about 1¼ miles to the west.

In Illinois, Deep Rock Oil Corp. 1 Johnpeter, NE SW SE 23-1n-3w, a rank wildcat in southern Clinton County, is being put on the pump after swabbing tests in which it produced at the rate of 5 bbl. of oil per hour. Production is from Devonian lime at 2,554-60 ft. Total depth is 2,564 ft. with casing at 2,550 ft. It is more than 6 miles from nearest production and more than 20 miles from nearest lime production.

ILLINOIS SUCCESSFUL WILDCATS

Clay County: Sohio Petroleum Co. 1 Fleming, NW NE SE 2-2n-5e, IP 22 bbl., Rosiclare 2,871-76 ft., TD 3,000 ft. (new pool south of Kenner pool).

Hamilton County: LaGrange Petroleum Co. 1 Howard, SW SW SW 16-7s-6e, IP 300 bbl., Palestine 2,071-78 ft., TD 2,078 ft. (opens new pool).

Richland County: George & Wrather 1 Provines, NE SE NW 34-3n-14w, IP 1,262 bbl., McClosky 3,115-21 ft., TD 3,159 ft. (extension Parkersburg pool).

Saline County: J. F. Balderson 1 Bruce, SE NE SE 24-7s-7e, IP 150 bbl., Aux Vases 2,935-55 ft., TD 3,161 ft. (opens new pool).

White County: J. B. Buchman and C. E.

O'Neal 1 Sturm, SE SW NE 36-3s-10e, IP 288 bbl., O'Hara 3,096-3,106 ft., TD 3,163 ft. (new pay and extension North Calvin area, Phillipstown Consolidated pool.

ILLINOIS WILDCAT FAILURES

Fayette County: A. Doty 1 First National, SW SE SE 24-9n-3e, dry, TD 1,690 ft.
A. Doty 1 Richards, SE NE SE 24-9n-3e, dry, TD 1,602 ft.
Jasper County: Jack Stapp 1 Brown, NW NW SE 4-5n-9e, dry, TD 3,225 ft.
N. C. Davis-Aurora Gasoline Co. 1 May, NW SW SW 8-6n-10e, dry, TD 2,886 ft.
Jefferson County: N. V. Duncan-Aurora Gasoline Co. 1 Woods Community, NW SE NW 26-4s-4e, dry, TD 3,381 ft.
Lawrence County: Barron Kidd 1 Kelsey, NW SE SW 30-2n-12w, dry, TD 2,013 ft.
Marion County: Columbus Exploration Co. 1 Lenniger, NE NE NW 11-4n-1e, dry, TD 1,875 ft.
Montgomery County: O. A. Reed 1 Feeny, NW SE SW 33-10n-4w, dry, TD 590 ft.
Richland County: R. M. Bears 1 Schneider, SW NW NW 5-3n-14w, dry, TD 3,275 ft.
White County: D. Hopkins 1 Elliott, NW NW NW 11-7s-10e, dry, TD 2,999 ft.

INDIANA SUCCESSFUL WILDCATS

Gibson County: Noah Petroleum Co. 2 Mumford, NW NW NW 27-3s-13w, IP 75 bbl., Cypress 2,435-44 ft., TD 2,444 ft. (opens new pool).
Sullivan County: Carter Oil Co. 1 Drake, NW SE SE 14-9n-10w, IP 180 bbl., Devonian 2,141-2,258 ft., TD 2,258 ft. (opens new pool).

INDIANA WILDCAT FAILURES

Posey County: G. L. Reasor 1 Stader, NW NE SW 8-7s-14w, dry, TD 2,960 ft.
Sullivan County: Walter Wyman 1 Risinger, NE SE SW 25-9n-10w, dry, TD 2,431 ft.
Warrick County: Calvert Drilling Co. 1 Brumley, NW NE NE 31-6s-8w, dry, TD 2,038 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Union County: F. B. Cline 1 Rudd Heirs, 11-N-18, dry, TD 3,134 ft.
Webster County: W. E. Parker 1 R. P. Parker, 10-M-24, dry, TD 980 ft.

California

Old Sargent Field Has New Pay Zone Discovery

LOS ANGELES.—An area where oil was originally discovered some 65 years ago —Sargent field of San Benito County in central coastal California—last week was the scene of a new oil discovery.

Located about 4 miles southeast of the now abandoned Sargent field, Jack Herley 1 O'Connell at last reports was pumping about 50 bbl. daily of 23°-gravity crude from perforations at 1,937-2,106 ft. The wildcat earlier had swabbed at the rate of about 150 bbl. daily, cut 6 per cent. Total depth of the test, located in Section 4-12s-4e, was 2,836 ft. before plugging back to 2,106 ft.

Sargent field, situated about 2 miles east of the San Andreas fault, was discovered in 1885. The dozen or so wells drilled there had produced about 784,000 bbl. of 13°-gravity crude before the 1,333-ft. producing sand was exhausted.

In Kern County, Race Track Hill field was given a two-location extension to the southwest by a 500-bbl. producer. The step-out was T. F. Morrow 1 Race Track Hill, in Section 3-30s-29e. Drilled to 4,760 ft., the well topped the Pyramid Hills sand at 4,740 ft. It was completed flowing 492 bbl. of 39°-gravity crude daily through a 10/64-in. bean.

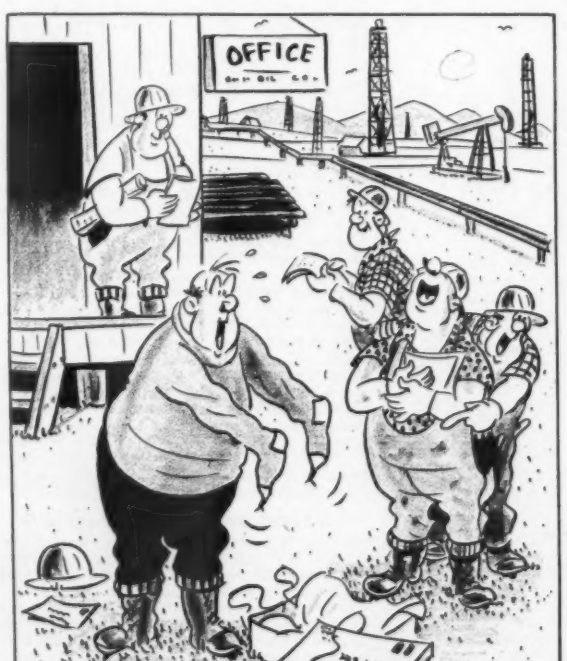
After some 3 weeks of unsuccessful testing of shows between 13,100 and 13,258 ft., General Petroleum Corp. was preparing to deepen its 44-14 B.L.C. in the Huron area of Fresno County. Drilled to 13,631 ft. and plugged back to 13,213 ft., at the week end the operator was cleaning out hole at 13,257 ft. It is expected that hole will be carried about 1,000 ft. deeper.

In the Cuyama Valley area drilling was suspended on one deep wildcat, another was getting under way, and a twice-abandoned extension well to Russell Ranch field was completed as a producer. After reaching 11,155 ft. Mohawk Petroleum Corp. suspended drilling at its 48-2 Humble-Lundstrom in Section 2-9n-26w. The new wildcat getting under way was Richfield Oil Corp. 2 Apache Unit in Section 30-8n-23w. It is located about ¾ mile northwest of its 1 Round Springs Unit, abandoned at 4,010 ft. early this year, and 3½ miles southeast of its 1 Apache Unit which was carried to 10,563 ft. before abandonment last spring.

The Russell Ranch extensioner was Richfield 2 Sloan-A, completed pumping 116 bbl. of crude in 21 hours, on the western edge of the field. About 2 years ago the well was abandoned at 2,075 ft.; 2 months ago it was deepened to 3,693 ft. but was still dry. On the latest attempt, hole was plugged back to 2,117 ft., whipstocked and redrilled to 3,440 ft. in the Colgrove sand.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, Trico area: H. H. Magee 1 Pacific Community, 7-25s-24e, completed flowing 2,500 M.c.f. gas daily through ⅜-in. bean from interval 3,243-51 ft., TD 3,304 ft., elev. 228 ft. Extended Atwell Island zone gas production of Trico field 1 mile to southeast.
San Luis Obispo County, northwest Cuyama area: Hancock Oil Co. 44-31 Hancock-Bishop, 31-32s-20e, completed pumping 170 bbl. in 11 hr., 31.8°-grav., 12 per cent cut, from oil sand topped at 5,644 ft., TD 6,235 ft., plugged back to 6,020 ft., elev. 3,515 ft. New field discovery, located 2¾ miles northwest of Morales field.



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CALIFORNIA WILDCAT FAILURES

Kern County, Comanche Point area: Standard Oil Co. of Calif. 4-32 Tejon-2, 32-12n-18w, dry, TD 3,492 ft., elev. 720 ft.

Tejon Hills area: Lee Clayton 1 Clayton Annex, 14-11n-18w, dry, top Chanac 800 ft., top granite 1,318 ft., TD 1,325 ft., elev. unknown.

North Antelope Hills area: Shell Oil Co. 52X-23 Hopkins fee, 23-27s-19e, dry, TD 3,000 ft., elev. 780 ft.

Los Angeles County, Castaic area: Macson Oil Co. 1 Lindsay, 26-5n-17w, dry, top oil sand 1,088 ft., TD 3,020 ft., elev. 1,375 ft.

Puente area: M. R. Peck & Sons 1-A Layaye, 33-1s-10w, dry, deepened from 1,160 ft., new TD 1,464 ft., elev. 420 ft.

San Luis Obispo County, Morales area: Richfield Oil Corp. 21-11 Ritter-C, 11-11n-28w, dry, TD 6,894 ft., elev. 2,901 ft.

Rocky Mountain

New Gas Discovery Made In Western Nebraska

DENVER.—A new gas discovery has apparently been made some 35 miles east of previous production in the Denver-Julesburg basin play. Ideal Drilling Co. 2 Bosley, SW SE SW 19-13n-42w, Deuel County, Nebraska, flowed an estimated 10 million cubic feet of gas daily on drill-stem test of the first sand in the Graneros series this week. Top of the sand was logged at 3,268 ft. and the test was made between 3,272-80 ft. Ideal, a Sidney, Neb., concern, cored additional gas sand between 3,280-89 ft. and found light oil stain in the bottom of this zone. A test of this basal zone failed and the operator is now drilling ahead prior to running casing for further tests. This well is one location south of Ideal's first wildcat in this area, and that well was a failure through the Lakota sand. The present well is reportedly 23 ft. higher structurally than the dry hole.

Carter Oil Co. has tested water in its second northeastern Colorado wildcat. Its 1 Scheetz, SE SE SW 11-3s-51w, made 1,800 ft. of water on 1 hour drill-stem test 3,997-4,020 ft. in the Upper Graneros section. On a previous test between 3,952-60 ft. the well made only 20 ft. of drilling fluid. This well is in the Harrisburg area, eastern Washington County, and some miles east and south of newly developed production in Morgan and Logan counties. Carter did seismic work through the area prior to making location for the wildcat.

The second producer in the Roosevelt area, Uintah County, Utah, has been completed by Carter Oil Co. and Stanolind Oil & Gas Co. The well is the 2 Ute Tribal, C NW SE 21-1s-1e, ½ mile east of the operator's discovery, which was completed last year flowing 1,600 bbl. of oil daily through choke. The new completion was drilled to 9,393 ft. in basal Green River formation and flowed 439 bbl. of 32.4°-gravity oil daily after acid treatment with 2,500 and 8,000 gal. Carter and Stanolind are coring below 9,094 ft. at their wildcat west of Roosevelt at Blue Bell, C SW NE 6-1s-2w, Duchesne County. A drill-stem test 8,949-9,055 ft. showed 810 ft. of gas-cut and very slightly oil-cut mud in 90 minutes. This well is still above the zone productive at Roosevelt.

A new-pay discovery for the Happy Springs area, Fremont County, Wyoming, is being completed by Sinclair Oil & Gas Co. The well, 2 Unit, SW NW SW 16-28n-93w, is swabbing approximately 260 bbl. of oil daily from the Frontier sand and the well will apparently be a better producer than the discovery well, which was completed producing oil from the Lakota sand recently. Top of Basal Frontier was logged at 5,904 ft. and Mowry 6,070 ft. Casing was cemented on top of the sand and the well will be completed at the present depth. Additional locations are reportedly being made for the field.

COLORADO WILDCAT FAILURE

Buelah, Pueblo County: Pure Oil Co. 1 E. K. Warren, NW SE SE, 13-23s-68w; 4,262 TD; plugged and abandoned; Fuson 97, Lakota 140, Morrison 240, Exeter 585, Fountain 665.

WYOMING WILDCAT FAILURES

North Brenning Basin, Converse County: L. H. Pearson 1 Govt., NW NE NW 26-34n-73w; 11,202 TD; plugged and abandoned; Mesa Verde 8,800, Steele 9,477, Shannon 10,732, Base Shannon 10,915.

Lightning Flat, Crook County: Amerada Petroleum Corp. 1 Ormesher, C NW NW 35-58n-68; 4,202 TD; plugged and abandoned; OWDD; OTD 3,450; Muddy 2,011, Dakota 2,283, Fuson 2,370, Lakota 2,435, Morrison 2,468, Spearfish 2,980, Minnekahta 3,409, Opeche 3,458, Minnelusa 3,575.

Sweetwater Unit, Fremont County: C. F. Freeman 2 Yellowstone, NW NE NE 21-29n-96w; 840 TD; plugged and abandoned; Chugwater 340, Alcova 620.

MONTANA WILDCAT FAILURE

West Poplar, Roosevelt County: Carter Oil Co.-Phillips Petroleum Co. 1 West Poplar Unit C-294, C NW SW k8-29n-50e; 5,050 TD; plubbed and abandoned; Judith River 4,270, Piper 4,616, Sawtooth 4,711, Gypsum Springs 4,768, Chugwater 5,004.

WESTERN NEBRASKA WILDCAT FAILURE

Rush Creek, Garden County: Kerr-McGee & Stanolind 1 Rush Creek, C SE NE; 25-21n-46w; 4,000 TD; plugged and abandoned; Niobrara 2,515, Codell 2,890, Greenhorn 3,089, first Sand 3,309, third Sand 3,480, Skull Creek 3,568, Cloverly 3,728, Mowry 3,982.

SOUTH DAKOTA WILDCAT FAILURE

Piedmont, Meade County: E. B. Kucera 4 Gingrass, C SE NW 19-3n-7e; 400 TD; plugged and abandoned.

Ohio Fields

Knox County Gets Large Gas Well from Clinton

COLUMBUS. — The Wray Drilling Co. struck a large-volume gas well on the 1 Mary Stricker, Section 9, Jackson Township, Knox County. The pay was in the second Clinton at 5,006-26 ft. and gaged 6,000,000 cu. ft. natural with 725 psi. rock pressure. Locations on offset leases are expected to be made soon.

Louis Swadley et al have completed a good well in the Berea sand on 2 Harve Douglas, Section 32, Lodi Township, Athens County. The sand was topped at 1,580 ft. and drilled to 1,585 ft. with a natural open flow of 620,000 cu. ft.

Another Newburg well was completed in Congress Township, Wayne County. The Ohio Fuel 1 A. N. Smith, Section 24, found pays at 2,845-50 ft. and 2,880-93 ft., which totaled 330,000 cu. ft. Tubing will be run and the well acidized.

Willard Shrider 1 P. & N. Richards, Third Quarter, New Castle Township, Coshocton County, is drilling in with very good oil showings.

Four new locations were reported in Meigs County, while Ashland had three and Holmes and Coshocton had two each, out of a total of 20 for the state. Cambridge field led in completions, having 6 out of a total of 18.

OHIO WILDCAT FAILURE

Muskingum County, Cass Township: Zane Oil & Gas Co. 1 Wm. Koppert, Lot 6, Clinton 3,258-3,304 ft., North Medina sand, TD 3,392 ft.

Halliburton Boosts Hansen to New Coordinator's Post

R. M. (Dick) Hansen, who has been works manager of Halliburton Oil Well Cementing Co.'s home-office plants and shops at Duncan, Okla., has been promoted to the newly created position of coordinator for Halliburton's engineering, materials, manufacturing, and transportation departments. Succeeding Hansen as works manager is Paul Scheefers, who had been Hansen's assistant. The promotions followed W. D. Owsley's elevation to technical vice president, with Hansen assuming many of Owsley's responsibilities.

R. M. HANSEN

Halliburton's new coordinator graduated from the Rensselaer Polytechnic Institute in 1934. He joined HOWCO in May 1936 as a truck driver at Wichita, Kans., became a cementer the following year, and was promoted to field engineer in 1938. Subsequent transfers took Hansen to Illinois, Texas, Louisiana, and the Rocky Mountain area. He came to Duncan in 1942 as a war-products-department testing engineer, later becoming war-products chief engineer and Halliburton's assistant chief engineer. He was named Halliburton's works manager in June 1945.

Glespen to Supervise Catalyst Sales

The Industrial Chemicals Division of American Cyanamid Co. announces the appointment of Gerald L. Glespen as supervisor of catalyst sales in the petroleum-chemicals department. Glespen, who joined the company in 1945, has been a technical field representative covering the Gulf Coast area for the petroleum chemicals department since 1948.

Howard E. Nehms will continue as manager of the petroleum chemicals department.

Byron Jackson Transfers Heibucher to Mid-Continent

C. F. (Bud) Vincent, Mid-Continent sales manager, Byron Jackson Co. oil tool division, Houston, announces the placement of Carl R. Heibucher to the BJ Mid-Continent oil tool sales organization.

Heibucher was born in St. Louis. He worked for Baker Oil Tools for 2 years before serving 2 years in the U. S. Army Air Force, from which he was released in 1946. He has been working in the BJ oil tool engineering department since 1947.

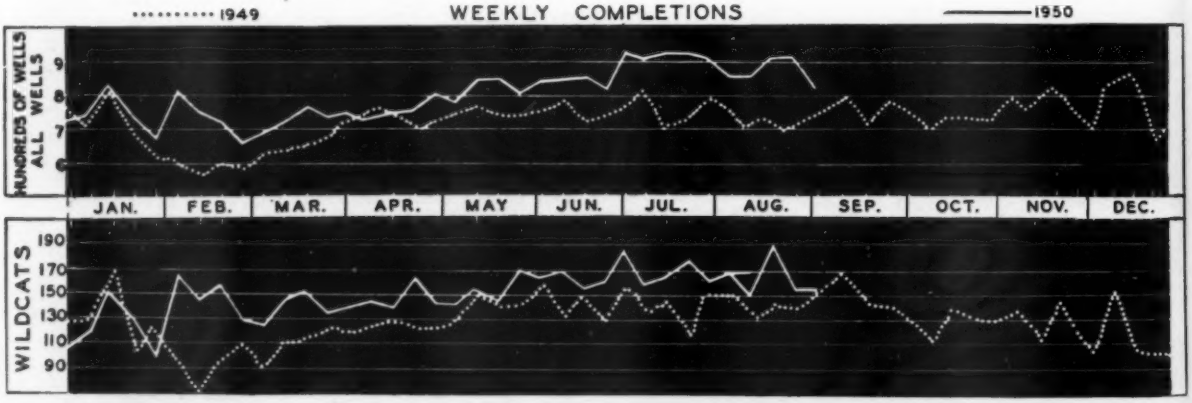
CURRENT STATISTICTS

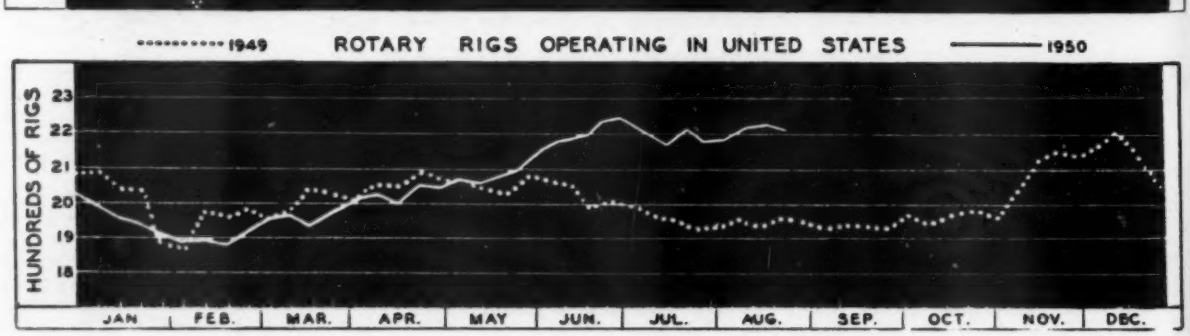
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED SEPTEMBER 2, 1950

	Total of all wells					Sept. 2		Wildcat completions and discoveries									
													Cumulative total, 1950				
	Comp.	Oil	Gas	Dry	Footage	1950	1949	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	17	9	0	*8	24,752	448	707	0	0	0	0	0	0	0	0	0	0
Pennsylvania	23	8	5	*10	42,502	897	1,122	0	0	0	0	0	0	0	1	2	3
West Virginia	14	3	10	1	39,309	450	328	0	0	1	0	1	0	0	14	15	29
Ohio	18	6	4	†8	35,168	662	741	0	0	0	1	1	1	0	2	8	11
Indiana	36	13	0	23	67,461	1,093	897	2	0	0	3	5	40	0	1	184	225
Kentucky	19	7	0	12	31,665	747	616	0	0	0	2	2	18	0	1	61	80
Illinois	79	41	1	37	186,532	1,812	1,680	5	0	0	10	15	38	0	1	402	441
Michigan	19	5	0	‡14	31,893	578	650	0	0	0	5	5	22	0	4	191	217
Kansas	80	40	3	§37	276,721	2,501	2,178	3	0	0	17	20	68	0	7	404	479
Nebraska	2	0	0	2	5,950	72	19	0	0	0	2	2	4	0	1	36	41
Oklahoma	97	61	8	28	341,925	3,630	2,910	5	0	0	12	17	112	6	11	443	572
Texas	314	193	14	107	1,332,652	10,915	9,059	11	1	1	53	66	338	27	72	1,717	2,154
North Central (Dist. 7-B & 9)	111	61	1	§49	306,103	3,321	3,015	7	0	0	23	30	149	2	19	679	849
West (Dist. 7-C & 8)	92	73	0	19	484,569	3,268	2,154	0	0	0	7	7	68	2	2	325	397
Panhandle (Dist. 10)	19	9	9	1	62,883	622	660	0	0	0	1	1	1	0	2	13	16
Eastern (Dist. 5, 6, & 6-P)	15	10	2	3	80,237	790	548	0	0	1	2	3	9	4	3	136	152
Gulf Coast (Dist. 2 & 3)	43	23	0	20	255,525	1,595	1,319	2	1	0	13	16	58	12	25	248	343
Southwest (Dist. 1 & 4)	34	17	2	15	143,335	1,389	1,323	2	0	0	7	9	53	7	21	316	397
Louisiana	42	26	2	14	241,735	1,639	1,541	0	1	0	4	5	33	15	5	137	190
Northern	25	15	2	8	96,531	878	884	0	1	0	2	3	4	3	2	63	72
Southern	17	11	0	6	145,204	761	657	0	0	0	2	2	29	12	3	74	118
Arkansas	8	4	0	4	32,386	273	217	0	0	0	2	2	8	0	0	66	74
Mississippi	5	2	0	3	39,401	216	239	0	0	0	1	1	8	2	0	77	87
Southeastern States	0	0	0	0	0	44	36	0	0	0	0	0	1	0	1	24	26
Montana	2	1	0	1	8,498	149	163	0	0	0	1	1	1	0	0	26	27
Wyoming	12	3	0	9	60,461	385	409	0	0	0	3	3	16	0	0	51	67
Colorado-Utah	2	0	0	2	6,454	53	83	0	0	0	1	1	4	0	0	33	37
New Mexico	8	6	0	2	31,213	415	351	0	0	0	0	0	10	1	0	37	48
California	34	23	1	10	147,595	1,185	1,754	1	0	1	5	7	17	0	3	254	274
Miscellaneous	1	0	0	1	400	35	15	0	0	0	1	1	0	0	0	10	10
Total United States	832	451	48	333	2,984,673	28,199	25,732	27	2	3	123	155	739	51	124	4,178	5,092
Total previous week	907	485	66	356	3,198,412	....	....	21	2	0	131	154	712	49	121	4,055	4,937
Total September 2, 1949	750	402	53	295	2,715,781	....	....	15	2	4	128	149	641	60	131	3,723	4,555

Service wells included: *8, †2, ‡4, §1.





DAILY AVERAGE PRODUCTION FOR WEEK

	Sept. 2 crude oil	B. of M. Sept. demand	Aug. 26 crude oil
Alabama	2,050	1,600	1,950
Arkansas	82,400	90,000	82,350
California	891,900	928,000	890,600
Colorado	62,700	67,000	63,700
Eastern	61,500	65,000	61,800
Florida	1,625	1,400	1,500
Illinois	176,900	188,000	174,700
Indiana	31,700	31,000	31,000
Kansas	293,500	306,000	303,900
Kentucky	27,800	30,000	27,700
Louisiana	576,000	590,000	574,800
North Louisiana	116,300	.....	116,250
South Louisiana	459,700	.....	458,550
Michigan	47,600	47,000	45,900
Mississippi	107,450	120,000	109,550
Montana	24,100	24,000	23,600
Nebraska	3,200	3,000	2,600
New Mexico	135,875	154,000	135,575
Oklahoma	470,150	460,000	466,300
Texas	2,520,975	2,260,000	2,463,950
Dist. 1 (Southwest)	29,800	.....	29,400
Dist. 2 (Southwest)	143,425	.....	140,425
Dist. 4 (Southwest)	226,075	.....	222,400
Dist. 3 (Gulf Coast)	438,775	.....	432,450
Dist. 5 (Eastern)	41,925	.....	41,050
Dist. 6 (Eastern)	99,525	.....	97,650
East Texas	283,550	.....	274,800
Dist. 7-C (West)	62,800	.....	61,350
Dist. 8 (West)	875,425	.....	846,100
Dist. 7-B (W. Central)	73,125	.....	72,325
Dist. 9 (N. Central)	154,725	.....	154,000
Dist. 10 (Panhandle)	91,825	.....	92,000
Utah	3,400	4,000	3,400
Wyoming	161,100	170,000	160,800
Total United States	*5,681,925	5,540,000	5,625,675
Change from previous week, up	56,250		
Canada	62,945	.....	88,330

Total U. S. production January 1-September 2 . †1,276,189,530 bbl.
Same period last year (crude plus cond.) ..... 1,244,045,985 bbl.

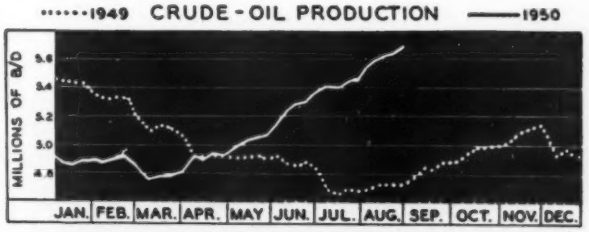
*Not including 96,550 bbl. condensate. †Including 23,838,955 bbl. condensate.

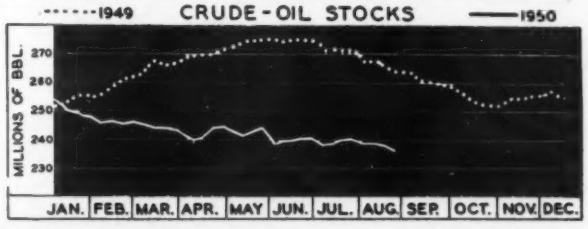
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

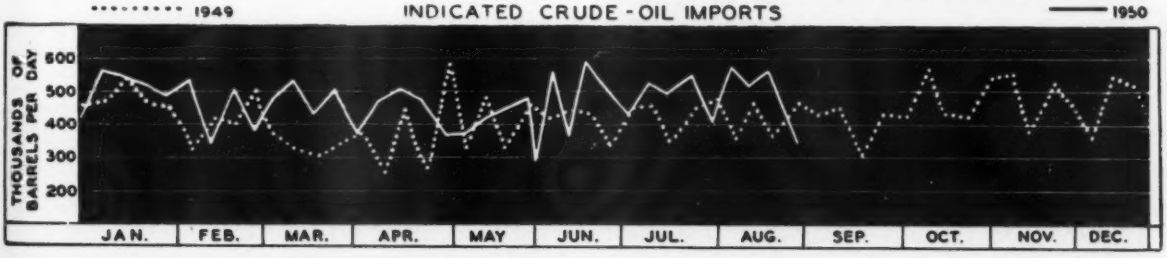
(Thousands of barrels)

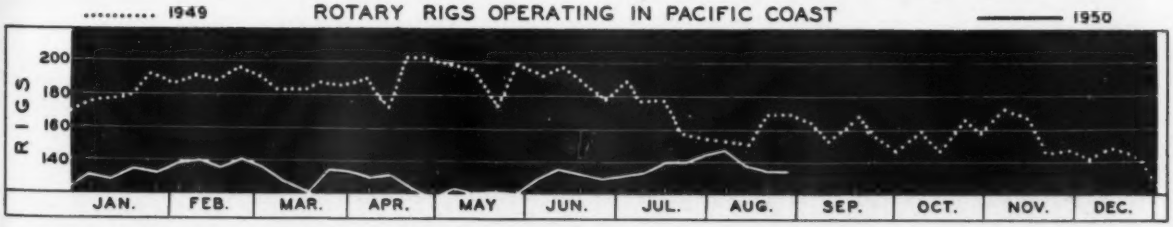
	Aug. 26, 1950	Aug. 19, 1950	Aug. 27, 1949
Pennsylvania Grade	2,604	2,641	3,465
Other Appalachian	1,293	1,200	1,854
Illinois, Indiana, Michigan	9,200	9,410	13,294
Arkansas	2,753	2,810	2,851
Louisiana	14,887	14,860	15,010
North	3,092	2,998	3,733
Gulf	11,795	11,862	11,277
Mississippi	2,317	2,479	2,727
New Mexico	6,111	5,875	7,739
Oklahoma and Kansas	33,650	33,487	39,243
Texas	114,053	113,945	121,611
East Texas	14,685	14,459	16,912
West Texas	42,962	42,291	48,778
Texas Gulf	28,040	28,481	28,757
Other Texas	28,366	28,704	27,164
Rocky Mountain	11,317	11,480	13,993
California	32,455	33,015	35,327
Foreign	6,294	7,259	7,344
Total	236,934	238,461	264,458

*Bureau of Mines.







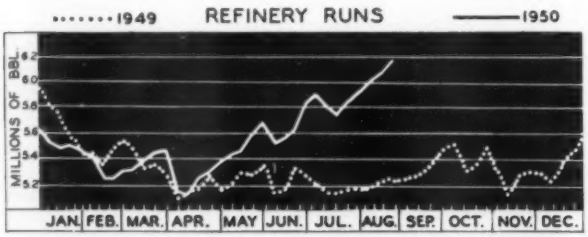


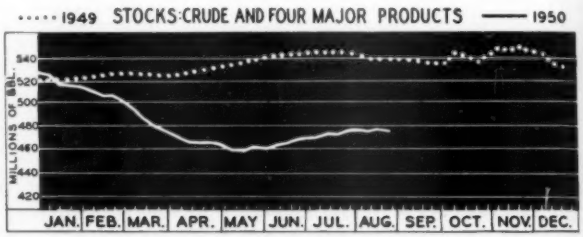
A.P.I. REFINERY REPORT, AUGUST 26

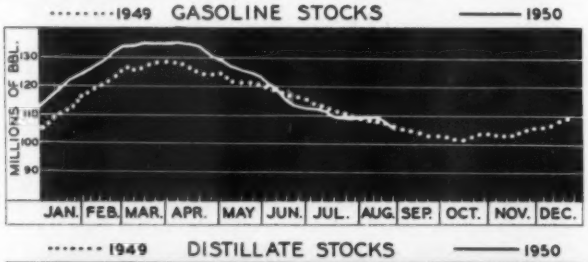
(Thousands of barrels)

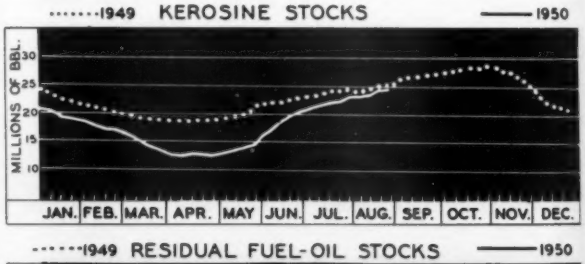
District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, August 1949: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	994	395.1	30.9	202.2	221.1	24,762	8,116	16,733	11,561	746	317.5	26.6	168.2	182.0
Appalachian:														
District 1	108	40.0	5.1	15.4	9.6	2,241	428	648	395	84	39.7	4.2	10.6	9.2
District 2	71	34.0	4.1	7.4	10.3	1,075	145	171	226	63	34.8	3.9	4.5	11.5
Ind., Ill., Ky.	1,101	590.8	68.0	162.4	145.6	22,114	5,374	11,526	4,413	882	486.6	45.0	120.1	118.0
Okla., Kans., Mo.	532	286.6	14.9	125.0	64.0	10,549	1,491	6,731	1,262	430	242.8	15.2	81.6	60.5
Inland Texas	218	146.9	13.2	28.0	40.0	3,056	549	1,349	882	218	144.7	7.1	29.2	43.0
Texas Gulf Coast	1,402	643.6	107.7	389.6	247.7	15,431	3,962	10,356	4,840	1,252	607.8	68.9	222.2	232.0
La. Gulf Coast	483	226.4	53.7	107.0	65.8	6,427	2,854	3,593	2,061	426	222.8	40.1	110.0	49.0
N. La. and Ark.	73	26.6	6.6	14.0	12.0	2,390	403	656	297	78	32.1	6.2	12.4	15.5
Rocky Mountain:														
New Mexico	14	7.1	0.4	2.1	3.0	92	25	51	38	12	6.9	0.1	2.3	3.1
Other Rocky Mtn.	208	89.3	5.6	39.3	34.0	3,529	493	1,946	840	183	81.1	4.8	31.8	37.1
California	993	408.3	14.4	87.4	367.3	14,127	989	12,081	14,882	867	376.4	9.3	109.4	317.0
August 26, 1950	6,197	2,894.7	324.6	1,079.8	1,220.4	105,793	24,829	65,841	41,697	5,241	2,593.2	231.4	902.3	1,077.9
August 19, 1950	6,099	3,045.6	323.6	1,054.3	1,187.3	108,274	24,413	65,107	42,008	.....	.....	.....	.....	.....
August 27, 1949	5,215	2,597.1	226.4	927.3	1,085.3	106,280	25,804	74,718	68,394	.....	.....	.....	.....	.....

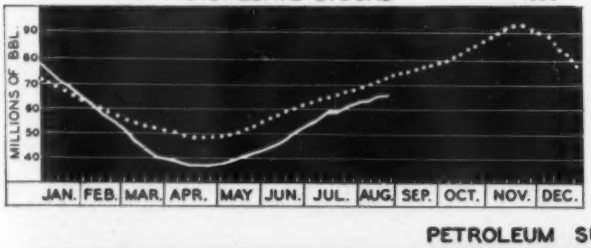
*At refineries including natural blended. †Finished and unfinished.

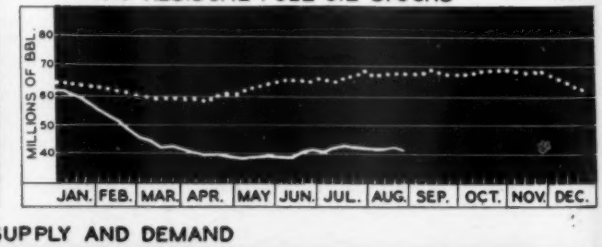


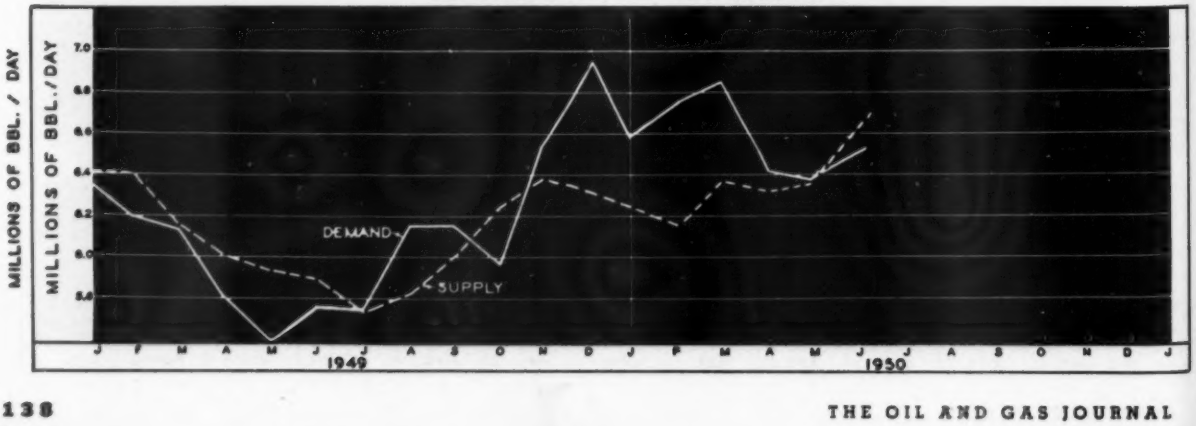












CRUDE PRICES
GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.69	....	....	....
19-19.9	1.77	....	....	....
20-20.9	1.85	$2.25	....	$2.12
21-21.9	1.93	2.27	....	2.14
22-22.9	2.00	2.29	....	2.16
23-23.9	2.08	2.31	....	2.18
24-24.9	2.15	2.33	$2.56	2.20
25-25.9	2.23	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.00
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

KEROSINE and No. 2 fuel prices moved up slightly on the Group 3 spot market under the influence of high-level sales. Kerosine was up .125 cent on the low to 8.875 cents while No. 2 distillate gained .125 cent to 8.125 cents. The latest increase brings the kerosine price up 1.125 cents from the low on the corresponding date last year and No. 2 fuel price up 1.75 cents for the same period.

Gains in sales of gasoline in the period prior to the Labor Day week end have tended to keep the Group 3 gasoline market firm at 10.375 cents, about .75 cent a gallon above the market at this time last year. So far this year, there has been no late-summer softening of the residual market. Most spot sales by Mid-Continent refiners are at $1.65 a barrel compared with the posted low of $.85 last year. Distress sales were made at prices well below the generally quoted low during the late summer months of 1949.

The steady upward trend in product prices has added about $.47 per barrel to the realization at Mid-Continent refineries. Some of the refineries that were operating at a loss last summer are again in the black.

For the country as a whole, refinery demand for kerosine in the 5-week period ended August 26 was up almost 36 per cent over the same period last year. Distillate demand was up about 20 per cent for the same period.

In periods of tight markets and high demands it is noted that more of the light fuel is marketed as kerosine and less as No. 1 fuel or range oil. Resellers and distributors have been taking kerosine when they were unable to buy range oil, and this has resulted in higher indicated demands for kerosine this summer. Combined demands for kerosine and range oil will follow the general upward trend.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotation of leading suppliers as of September 4, 1950. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅜-10½	12.5-12.75	10¾-11½
Premium gasoline, 86-88 octane	11¼-11½	13.5-13.75	11½-12½
42-44 w.w. kerosine	8⅞-9	9.5-9.6	8½-8⅝
No. 2 straw fuel oil	8⅛-8¼	8.5	7½-7¾
No. 6 residual	$1.65-1.75	$2.15	$1.80-1.85

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5⅞	5⅜	5⅝
Grade 18-55	7.05	6.55	6.80

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12.5
750 vis., No. 3-4 neutral	14.75
2,000 No. 5-6 neutral	16.5

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	24
200 vis., No. 3 neutral, 0-10 pp.	14.5-15.5

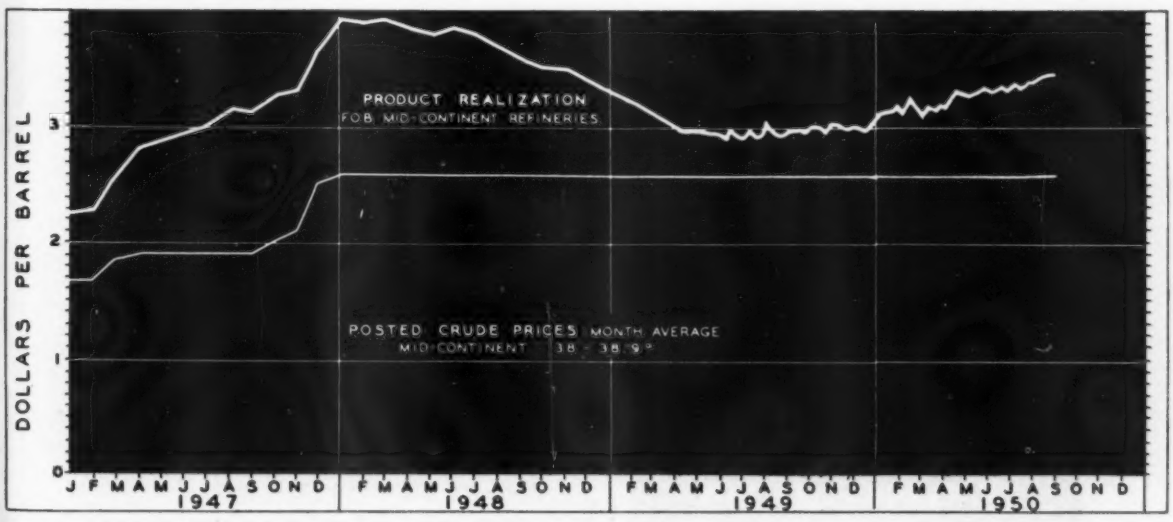
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	27.5
180 vis., 0 p.t. neutral	28.5

WAX

Mid-Continent

132-134 A.M.P.	4.50


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
0
1
2
3
J F M A M J J A S O N D
1947
F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.48 for week ended August 26, $3.48 for previous week, and $2.98 for August 1949.

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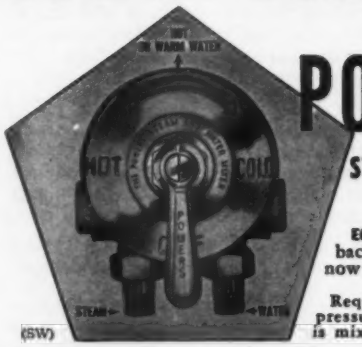
For a Small, Localized Supply of Warm or

HOT WATER

Use

POWERS

STEAM and WATER MIXERS



(SW)

ECONOMICAL—Quickly pay back their cost. Thousands now in use. *Easy to Install.*

Requires steam and water pressures above 10 lbs. Steam is mixed directly with water.

MANY USES—Industrial processes; 180° F. sterilizing rinse water for dishwashers; washing oil drums, trucks, etc.

TEMPERATURE RANGE—Any temperature desired between that of incoming water and 200° F.

HAS PRESSURE EQUALIZING VALVE—which prevents delivery temperature changes caused by fluctuating pressures of steam or water.

SMALL SIZE—½" pipe size can be held in the palm of the hand, has 5" dial; ¾" size has 7" diam. dial.

CAPACITIES—based on steam and water at 45 lbs. pressure each, water at 60°F., and delivery temperature of 160° F.:—½" size=3 gals. per min.; ¾" size=8 gpm. Mixing steam with 140°F. water increases delivery about 75%. Often used as a small booster heater. ***WRITE for Bulletin 358-S.***

THE POWERS REGULATOR COMPANY

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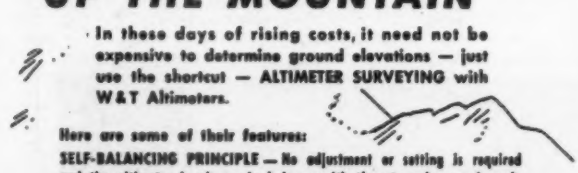
W&T altimeters--

the *Shortcut*

UP THE MOUNTAIN



In these days of rising costs, it need not be expensive to determine ground elevations — just use the shortcut — ALTIMETER SURVEYING with W&T Altimeters.

Here are some of their features:

SELF-BALANCING PRINCIPLE — No adjustment or setting is required and the altimeter is always in balance with the atmosphere and ready to read. There is no lag.

CALIBRATION – Scales are individually drawn for each mechanism and require no correction. Graduations are spaced for easy readability and not so fine as to cause confusion.

RANGE – Ranges of 2,000 feet, 7,000 feet, and 15,000 feet are standard. Special ranges are available to order.

DURABILITY – The mechanism is simple and free of intricate design features. It is shock-proofed in the instrument case.

PERFORMANCE – W&T Altimeters rival the accuracy of the finest laboratory standards for measuring pressure – their performance is guaranteed.

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GOTT Water Cans are the practical way to keep drinking water cool for long periods, protected from impurities and always handy to the job. Snug fitting large removable top, strongly built to withstand rough usage. Gott Water Coolers have extra large covers and a handy non-leaking push button faucet. Your Supply Store has them, get one today.

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GOTKOOL WATER COOLER

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As a service to its subscribers, the Journal offers the following technical manuals for sale in limited quantities. To facilitate handling, enclose the address label from your Journal.

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Modern Rotary Drilling — (J. Zaba)	1.00
Oil Well Pumping Methods — (J. Zaba)	1.00
Engineering Fundamentals — Advanced Reservoir Engineering — (John C. Calhoun)	
Part 1 — (300 to 345)	1.00
Part 2 — (346 to 385)	1.00
Engineering Fundamentals in Modern Drilling (Glenn Stearns)	1.00
Reference Manual on Electric Logging (S. J. Pirson and others)	1.00
Cost-Imating (W. L. Nelson)	1.00
Production Engineering and Reservoir Mechanics — (Park J. Jones)	1.00
Manual on Heat Transfer (Buthod and Whiteley)	1.00
Questions on Technology — (W. L. Nelson)	1.00
Drilling Handbook — (From 9-22-49 Issue)	.50

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THE OIL AND GAS JOURNAL

TULSA OKLAHOMA

EQUIPMENT MEN ... in the News

McClelland Heads Pritchard's New York Office

J. F. Pritchard & Co., Kansas City, Mo., has formally opened a new district office in the Chrysler Building, New York City, to serve New York, Connecticut, New Jersey, and eastern Pennsylvania. The office is under the management of A. B. McClelland, Jr., who recently joined the Pritchard organization. Well known in New England area for his sales-engineering work involving the design and construction of plant facilities for the petroleum and chemical-process industries, McClelland's recent activities include 9 years as a sales engineer for M. W. Kellogg Co. and 2 years as sales manager for Project Engineering Co.

©Bachrach

Dittbrenner to Represent Carboline in Eastern Area

Carboline Co. of St. Louis has announced the appointment of R. A. Dittbrenner as eastern representative. Dittbrenner has been employed in corrosion work for the past 17 years.

In addition to being its eastern representative, Dittbrenner will handle the advertising and sales promotion for Carboline on its line of thermosetting and thermoplastic coatings and linings for erosion and corrosion service.

Oil Men's Caravan to Serve Los Angeles A.P.I. Meet

Another Oil Men's Caravan special train has been arranged and will operate to and from the thirtieth American Petroleum Institute annual meeting to be held in Los Angeles November 13 to 16.

The Oil Men's Caravan will have lightweight streamlined Pullman cars with roomettes, bedrooms, compartments, and drawing rooms, and will also feature a special club-bar car providing for various forms of entertainment while en route. This trip will leave New York and other eastern cities November 8, Chicago November 9, and the group remains all day November 11 at Las Vegas, Nev., including an inspection trip to Hoover Dam.

A special luncheon, together with a dinner dance and floor show at the fabulous Flamingo Hotel in Las Vegas, has been arranged. There will be a special luncheon stop at Mission Inn in Riverside, Calif., on Sunday, November 12, and the train arrives in Los Angeles at 3 p.m. that date.

Returning, the caravan leaves Los Angeles November 16 in the evening and a stop will be made at El Paso, Tex., with a visit to Carlsbad Caverns on Saturday, November 12. The evening of November 17 will be spent in Juarez, Mexico. The train arrives back in Chicago Monday morning, November 20 and in eastern cities November 21.

Caldwell Heads Houston Firm

Charles Buford Caldwell, who was associated with Hughes Tool Co. for 13 years, is the new president of Harrisburg Sales & Service, Inc., Houston. Born in Vernon, Tex., Caldwell finished Amarillo Junior College in 1934, and for the following 3 years studied mechanical engineering at Rice Institute. He joined Hughes Tool Co. at Houston in 1937.

From 1937 until November of 1947, he was employed as a field salesman —first in Hays, Kans., next in Oklahoma City, and finally in Ardmore, Okla. He then was assigned to Oklahoma City as special sales representative. In December 1948 he was transferred to Dallas, where he served as a special representative until the summer of 1950.

Roger Henquet, left, executive vice president of Schlumberger Well Surveying Corp., and R. R. Rieke, sales manager, have just placed Schlumberger's new trade-mark on a field unit for the first time. The trade-mark will soon be seen on all Schlumberger trucks and equipment in the field. Log heading designs also have been changed to include the new trade-mark. Designed by Henquet, it features a derrick and the name Schlumberger superimposed on an electrical log.

Happy Co. Opens Dallas Office

The Happy Co., Tulsa, announces the opening of a Dallas sales and engineering office. Jack Simpson, sales engineer, is manager of the office located at 519 Santa Fe Building (Second unit).

Simpson is a graduate engineer from Oklahoma University. He has spent the past 4 years in the Tulsa office of Happy Co. The new designs of air-cooled, finned-tube, radiator-type cooling are partly due to him; as he was one of the engineers assigned the job of designing the new cooling line. He will represent the full Happy company line including Boston woven hose, industrial hose, rubber belting, leather belting, Bull Dog V-belts, Sure-Grip sheaves, Happy P & H engine starters, safety switches, pumping units, and power-transmission equipment.

Bridgeport Brass Appoints New Houston Manager

Bridgeport Brass Co. has announced the appointment of E. D. (Pat) Casseday as Houston district sales manager to succeed George Chatneuff.

Casseday was recently with Bridgeport's Los Angeles office. He has been connected with the copper and brass industry for the past 15 years, with experience in both the condenser and heat-exchanger field, as well as in plumbing and heating. In his new position he will be responsible for the sale of all Bridgeport products in Southeastern Texas.

Flexitallic Adds New Agents and Distributors

Flexitallic Gasket Co., Camden, N. J., has recently added three new agents and one new distributor to its field organization. Metrol Co., Detroit, is a new Flexitallic agent and will serve the entire Lower Peninsula of Michigan, including the Toledo area in Ohio.

Power Specialty Co., Houston, is a new Flexitallic distributor and will

XUM

serve eastern Texas and western Louisiana. Illes Power Control Co., Cleveland, is a new Flexitallic agent and will serve northern Ohio, east of the Toledo area.

Airdraulic Equipment Co., Buffalo, is a new Flexitallic agent and will serve western New York, including the Syracuse area.

S.S.C. Organizes Gravity and Magnetometer Division

G. H. Westby, president of Seismograph Service Corp., Tulsa, has announced the addition of gravity and magnetometer service to the other world-wide geophysical exploration services offered by the company and its affiliates.

R. A. POHLY

Along with this announcement, Westby confirmed the appointment of Richard A. Pohly as manager of the company's newly organized gravity and magnetometer division.

Pohly completed his studies at University of Michigan in 1937, at which time he joined the gravity exploration division of Shell Oil Co. In 1945 he organized Global Exploration Co. which he operated until 1947 when he accepted a position with General Geophysical Co. He comes to S.S.C. from United Geophysical Co., where he was manager of domestic gravity surveys.

Pacific Pumps Adds to Houston Sales Staff

Elmer J. Weis, vice president, Pacific Pumps, Inc., manufacturers of centrifugal pumps, announces the appointment of John Wahlstrand as sales engineer with headquarters in the Houston office of the company.

J. WAHLSTRAND

Wahlstrand has resided in Houston since 1943 and is an associate member of the Houston Engineers' Club. He is well known throughout petroleum, chemical, and other industries in Texas, Louisiana, Mississippi, and Alabama.

Stentz Equipment Co. Moves to New Location

Stentz Equipment Co. recently moved its headquarters office at Tulsa from 226 East Fourth Street to 5605 East Admiral Place.

New headquarters include both offices and show rooms in the front of the building, and an extensive warehouse in the rear. This expansion permits the company to maintain all of its warehouse stock, as well as manufacturing, in a central location which was not possible at the old headquarters. In addition to manufacturing SECO automatic tank shutoff valves and switches, the company retains a complete warehouse stock of spare parts for Marlow pumps and Hypro engineering products.

Producers Supply & Tool Announces Changes

J. R. O'Brien, Producers Supply & Tool Co., Fort Worth, announces that D. L. (Don) Collins, who was manager of the Turnertown store, has been moved to Snyder, Tex., as manager there. Also that W. T. (Bill) Douglas, who was manager at San Benito, has been moved to Midland, Tex., where he will contact operators at Midland and Odessa.

Huey Made Manager, United Supply Dallas Office

W. H. HUEY

W. H. Huey, formerly assistant district manager of Oklahoma for United Supply & Manufacturing Co., has been appointed manager of the Dallas office. Huey's former headquarters was at Pauls Valley, Okla.

Graver Opens Cincinnati District Sales Office

Graver Tank & Manufacturing Co., Inc., East Chicago, Ind., fabricators and erectors of steel and alloy plate for the petroleum and process industries, recently opened a district sales office in Cincinnati in the Transportation Building, to expedite service to its customers in that area.

John R. O'Connor, formerly at company headquarters in East Chicago, was made manager of the Cincinnati office. A mechanical engineering graduate of Purdue University, O'Connor joined Graver 4 years ago upon his release from the Army.

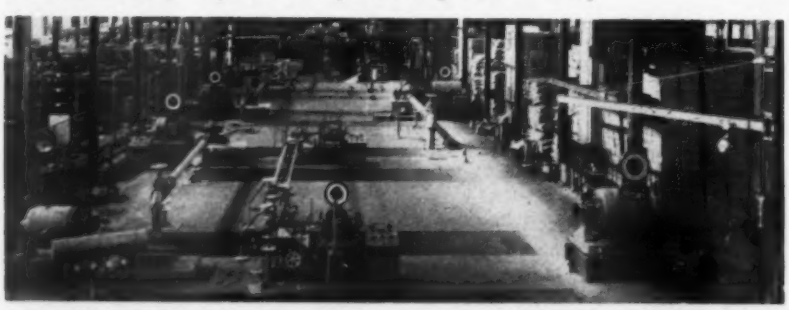
Dobbins Goes With TOTCO In Cody, Wyoming

H. H. (Pete) Peters, vice president, Technical Oil Tool Corp., Inc., has announced the appointment of R. A. (Dick) Dobbins as sales representative for TOTCO in the Cody, Wyo., area. Dobbins replaces P. T. Bannerman who was recently transferred to Bakersfield, Calif.

Dobbins has worked for 9 years in the oil fields, and is well acquainted in the Cody area, having been employed by both drilling and producing companies near there for the past several years.

(Continued on page 147)

Peerless Pump Opens Pump-Testing Laboratory



General view showing eight test stations in the new quarter-million-dollar pump-testing laboratory at the Indianapolis Works of the Peerless Pump Division of Food Machinery & Chemical Corp. Pumps of all sizes and capacities from 5 to 86,000 g.p.m. and from 1 to 1,000 hp. can be accurately tested to .05 per cent efficiency.

Peerless Pump Division of Food Machinery & Chemical Corp. has announced the completion of a new pump-testing laboratory at the Indianapolis Works, Indianapolis. The installation, finished this month, involves a consideration of over a quarter million dollars and establishes a completely new set of standards in pump-testing procedures in this field of product manufacture. The laboratory occupies over 7,000 sq. ft. of floor area and includes a total of eight pump stations. Both high and low-voltage equipment is available, making use of motors up to 1,000 hp. in size. The Peerless test laboratory is designed for a capacity of over half a million gallons of water.

Pumps are tested to obtain their complete performance characteristics, to observe their operation, and to compare results in the laboratory, with design performance data.

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FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
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WELL equipment. New and used spudders, rotaries, core drills, all sizes and types. Cable tools, drill pipe, bits, pipe. Fishing tools rented. Everything for well service. Pressey & Son, Pueblo, Colo.

FOR SALE: 300 Amp Westinghouse welding machine powered by 6-BK Waukesha engine. Completely overhauled. Less than 50% of new price. Melton Supply Company, Box 1360, Seminole, Oklahoma.

FOR SALE: 5000' rotary rig complete; Wilson Giant draw works powered by two JL-1335 Buda engines compounded. New 96' L. C. Moore jackknife with base, 7¼" X 14" mud pump, 7 X 12 steel tool house, B. J. hook, Emsco swivel, excellent 4½" drill pipe, and all other equipment to complete rig. Terms if desired. For inventory, write Melton Supply Company, Box 1360, Seminole, Oklahoma.

FOR SALE

Hydraulic Casing Pulling Units, Hydraulic Jacks, Casing Spiders, Rings & Slips. Also,
Skid Mounted Cementing Unit, Complete.
Write or Call

OKLAHOMA MACHINE & SUPPLY CO.
Phone 780 Ada, Okla. P. O. Box 997

FOR SALE

9—230 H.P. Bessemer Type 10 Engines with compressors, Steel Buildings, Valves and Fittings complete for installation. Located Salem, Illinois Oilfield.

ENGLE PETROLEUM, INCORPORATED
Box 655, Evansville, Indiana
Telephone 5-5179

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STEEL TANKS

7—10'6" x 17'9" x ¼" plate
4—10' ID x 30' long x 5/16" shell, 11/16" heads, 17,500 gallons cap.
1—9' OD x 34'3" x 3/8" shell
1—9' OD x 79'10" x 5/16" shell
1—8' ID x 40' long x 1/4" shell
1—11' ID x 50'5" x 3/4" shell
2—10'6" x 40' long x 3/8" shell
1—7'4" x 32'6", 10,000 gallon cap.
1—4'6" x 18', U-69, 300# W.P.
1—56" x 22', U-69, 300# W.P.

ROGERS AND WRIGHT, INC.
710 Peoples Building
Charleston, West Virginia
(Phone 30171)

EQUIPMENT FOR SALE

FOR SALE: One deep oil well drilling outfit, Leidecker machine with derrick, Franklin engine and drilling tools. In A-1 shape. W. O. Melick, Somerset, Ohio, Phone 3127.

FOR SALE at our Sasakwa Gasoline Plant—1 Fluor Cooling Tower, 10 bays high 5 bays wide. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

IDECO complete oil rig on sixteen wheel trailer for sale or lease. Terms. Tel.: Orchard 13514 or write E. D. Warren, 302 East Queen Street, Inglewood, Calif.

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

SALT WATER PIPE

60c ft. 5⅛" x 4 9/16"
100 lb. Test
Roll or Bolted Couplings—$1 up

GOOD-ALL MFG. CO.
Ogalala, Neb.

EQUIPMENT FOR SALE

FOR SALE: 36-L Bucyrus-Erie, excellent condition, 1947 Model, rubber mounted. D. E. Davis, Poneto, Indiana. Phone: Bluffton, Indiana, 972-2.

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES. E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-5407.

A REAL VALUE
PORTABLE TRUCK MOUNTED RIG

Wichtex #5 Drawworks W/American Cat Head, Powered W/WKU Waukesha Engine & Starting Motor, 7¼" x 12" FXZ Gardner-Denver Power Pump, Powered W/ NKU Waukesha Engine W/ Starting Motor, 14" Ideco Oil Bath Rotary Table, 91' Double Mast W/ Crown Block, 36" Emsco Traveling Block, 100 Ton B. J. Hook, Above purchased New July, 1948, 1 Dart Tandem Truck W/ H600 Cummings Diesel Engine W/ Starting Motor, 1100 x 20 Dual Tires, Overload Springs, Tulsa Winch, Complete Overhaul 1948, Franks #5200 Swivel, 2—Light Plants, 2 Water Pumps, Shale Shaker, Blow Out Preventer, 3500' of 4½" 16.60 Drill Pipe, Complete With All Tongs, Elevators, Slips, Drill Collars, 3500' 2" Line Pipe, Pipe Straightener, Rig is Winterized and Partly Steam Fitted, Located Wyoming, Cost $80,000. Write For Inventory.
Price Complete F.O.B. location . . $37,500.00

H. A. McCARTHY
310 Thompson Bldg., Tulsa, Okla. 5-3296

LIQUIDATION SPECIALS!
REFINERY EQUIPMENT
for IMMEDIATE DELIVERY

TOWERS and VESSELS
★
PUMPS, TURBINES and MOTORS
★
HEAT EXCHANGERS and CONDENSERS
★
INSTRUMENTS, METERS, GAUGES

WRITE — WIRE — PHONE
YOUR NEEDS
and for
COMPLETE LISTINGS

DULIEN STEEL PRODUCTS, INC.
of Washington
P. O. BOX 667
COTTON VALLEY, LA.
PHONE: COTTON VALLEY 26

XUM

EQUIPMENT FOR SALE

FOR SALE: 3300 ft. of 4½ in. Pittsburg seamless, range 2 Drill Pipe with Hughes flash weld full hole, tool joints. Pipe has drilled about 40,000 ft. of hole. 4—125 H.P. 300 lb. Boiler. 2—110 H.P. 250 lb. Boiler. All in excellent shape, will pass Insurance and State requirements. 3,000 ft. of 5½ in., 20 lb. range 2 Seamless Casing with J55 couplings. 600 ft. of 2½ in. 20 ft. lengths Drill Pipe. Contact—Box 1517, Phone 3957, Pampa, Texas.

FOR SALE: 4—300 WP Dome Locomotive-Type boilers; one steam sand reel, 12,000' Cap.; one boiler feed system complete.—R. W. Noble, Phone 601, Box 866, Jennings, La.

NEW CASING AND TUBING

5½" J-55—15½# and 2⅜" OD tubing to trade only for interest or override in proven territory.

Send full details and map.

W. C. BERRY
P.O. Box 1858 Tulsa, Okla.

PIPE FOR SALE

50,000 ft. 6⅝" OD 17.02 new Youngstown Lapweld, Range 1 Line Pipe. FOB rail point Wyoming. Wire inquiries.

Material subject to prior sale.

AMERICAN PIPE & SUPPLY CO.
125 South Ash, Phone 447, Casper, Wyo.

Reconditioned
Seamless Tubing

65,000 ft. 1⅞" O.D.
55,000 ft. 1½" O.D.
40,000 ft. 2" O.D.
30,000 ft. 3¼" O.D.
20,000 ft. 3½" O.D.
25,000 ft. 4" O.D.
45,000 ft. 5½" O.D.

Approximately 9 gauge wall.
Single or Double Random Lengths.

WRITE—WIRE—PHONE

SONKEN-GALAMBA CORPORATION
2nd and Riverview (X823)
Kansas City 18, Kansas
THatcher 9243

EQUIPMENT FOR SALE

AVAILABLE for sale and immediate shipment 2—1 T & C 2" line pipe, seamless and lapweld casing, tanks. Call or write Edco Pipe & Supply Company, Box 565, Drumright, Oklahoma.

WAR SURPLUS MACHINERY

Gaso, Byron Jackson, Aurora, Wayne, Lombard & Hale Fire Pumps with Engines, 1½ to 25 KW Generator Sets or Light Plants, Engines, Suction Hose, Fire Hose, Victaulic Couplings & Etc. Write for listing. H. A. McCarthy, 310 Thompson Bldg., Phone 5-3296. Tulsa, Oklahoma

CABLE TOOL GASING SPEARS SURPLUS

15—IDECO 4 slip Fox Trip for 8 inch I.D. Casing

Brand New—with pulldown Pin Size 2 x 3-7 A.P.I.

PRICE $100 EACH F.O.B. LOS ANGELES

This is more than one-third of factory price—cheaper than renting.

Drilling & Mining Equipment Co.
2020 Sacramento St.
Los Angeles 21, California
Bucyrus-Erie Cable Tool Distributors

EQUIPMENT WANTED

WANTED: Any tonnage 5½" OD & 7" OD seamless T & C New or Grade A Used. Spot delivery only, must be priced right. Box D-652, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: New or prime used seamless A-53 or A-106 pipe in 2", 3", and 4", standard, extra heavy, and double extra heavy. Horwitz Pipe & Steel Co., 415 S. Western, Okla. City, Okla.

WANTED!
Pipe Threading Machines
6", 8" and 12"

Landis or Bignall & Keeler with Landis Heads. Machines must be in good working order with individual motor drives. Give complete description including make, model and serial numbers, width of dies or chasers, motor specifications and prices.

CENTRALIA PIPE & SUPPLY CO.
Box 454—Tele. 6771
Centralia, Illinois

EQUIPMENT WANTED

WANTED: Steel Tanks for re-erection. One 25,000 bbl. Two 2500 bbl. Three 15,000 gals. and Three 20,000 gals. For delivery in So. Eastern and Midwestern States. Bituminous Products Co., 310 S. Michigan Ave., Chicago, Ill.

WANTED: USED 4½" DRILL PIPE
Box D-606, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

SALES ENGINEERS
OPERATIONS SUPERVISORS
PERFORATOR OPERATORS

Only Experienced Men Need Apply.

WRITE ONLY

WELEX JET SERVICES, INC.
3909 Hemphill Street, Fort Worth 9, Tex.

Instrument Repairman, First Class to work in Celanese Chemical Plant in the Corpus Christi, Texas, area. Permanent job at $2.10 per hour. Must be capable of repairing, overhauling, installing, and doing general trouble shooting on all types of Automatic Control Systems; such as Taylor, Foxboro, Brown, Leeds-Northrup, Fisher, and Westcotts. Must be acquainted with the general operations of towers, furnaces, boiler equipment, and be qualified to work from Engineering Blue Prints and Specifications.

In letter, applicant should give his complete work history with description of duties performed, equipment worked on, physical description, age, and number of dependents.

Address replies to
CELANESE CORPORATION OF AMERICA
Attention: Employment Manager, P. O. Box 148, Bishop, Texas

ESTIMATOR

Experienced ENGINEER familiar with Oil Refinery design and capable of estimating process equipment from flow diagrams.

Give full information, experience record and salary expected.

ARTHUR G. McKEE & CO.
2300 CHESTER AVE.
CLEVELAND 1, OHIO

NEW SMALL OIL REFINERY IN BOLIVIA, S. A., REQUIRES EXPERIENCED PERSONNEL AS FOLLOWS FOR ONE YEAR WITH OPPORTUNITY RENEWAL CONTRACT. SALARIES PAID IN U. S. FUNDS:

CHIEF CHEMIST: Graduate chemical engineer minimum three to five years' refinery experience including control laboratory work and technical service in plant operations especially light ends and aviation gasoline blending.

CHIEF OPERATOR: Minimum five years' all-round refinery experience particularly with precise fractionation including operating foreman experience; capable directing refinery utility services. Graduate chemical engineer preferred.

OPERATORS: Experienced shift operators capable supervising plant and utilities operations especially precise fractionation; general over-all refinery experience necessary.

OCTANE TESTER: Thoroughly experienced routine methods and maintenance on aviation gasoline knock-testing engine.

INSTRUMENT MAN: Thoroughly experienced capable assuming responsibility of instrument department.

Write: Box D-665
The Oil and Gas Journal,
Tulsa, Oklahoma

EQUIPMENT FOR SALE

NEW LINE PIPE

150,000 ft.—2⅜" O.D. 3.65# Continuous Weld
50,000 ft.—3½" O.D. 7.57# Continuous Weld
100,000 ft.—4½" O.D. 10.79# Continuous Weld
75,000 ft.—8⅝" O.D. 24.69# Seamless
50,000 ft.—10¾" O.D. 28.04# Seamless
60,000 ft.—12¾" O.D. 37.45# Seamless
20,000 ft.—16" O.D. 52.35# Seamless

Specifications on above line pipe from 2⅜" to 8⅝" inclusive are API Grade B 5-L. Other sizes to 16" inclusive API Grade B 5-LX-42. All pipe has Plain Ends beveled for welding.

This pipe has been purchased from one of the leading European mills who are licensed by the API to manufacture pipe under their specifications and use their monogram.

Delivery schedule to East or Gulf Coast is October, November and December, 1950. Further details on specifications, lengths, price, available upon request,

BOX D-639, THE OIL AND GAS JOURNAL
TULSA, OKLAHOMA

HELP WANTED

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla.

EXPERIENCED Geophysicist with geological background for review and interpretation of seismic data. State age, training, experience. Reply Box D-654, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM TECHNOLOGIST

Skilled particularly in reservoir engineering, production, and drilling. Must be recognized authority in the field with outstanding record of accomplishment and acquaintance in the industry. To assume responsiblity for and be Director of our Petroleum Technology Division.

Southwest Research Institute
San Antonio, Texas

ASSISTANT PIPELINE SUP'T.

An American oil company operating in South America requires on its regular staff a man thoroughly experienced in all phases of White Products Pipeline operations.

Write giving age, marital status, education, and details of experience. Communications will be held in strict confidence.

Box 308-K

Radio City Station
New York 19, New York

WANTED
TOP SAFETY ENGINEER

for Industrial Chemical Plant, Denver, Colorado; experienced in chemical safety work and industrial hygiene. Must be graduate engineer, capable of conducting safety meetings in plant and directing safety procedure.

Write: Box D-666

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

Maintenance Mechanic, First Class for Maintenance Repair, overhaul, and trouble shooting on 400 to 1,000 H.P. 2 and 4-cycle Clark, Worthington, Ingersoll-Rand, Steam and Gas Engines, Turbines, Pumps, Gear Boxes and Reduction Gears. In Celanese Chemical Plant in the Corpus Christi, Texas, area. Permanent job at a rate of $2.10 per hour. Experience desired. Selected applicant will be notified to report for personal interview and a physical examination.

In letter, applicant should give his complete work history with description of duties performed, equipment worked on, physical description, age, and number of dependents.

Address replies to

CELANESE CORPORATION OF AMERICA
Attention: Employment Manager,
P. O. Box 148, Bishop, Texas

SEISMOLOGIST

Experience, five years or more, required for Seismic Supervision and Interpretation in Head Office of Major Oil Company operating in Saskatchewan. Salary commensurate with experience and ability.

All replies confidential.

Apply in writing to Chief Geophysicist,

SOHIO PETROLEUM COMPANY

1822 Albert St., REGINA, SASK.

HELP WANTED

EXPERIENCED Geophysicist with geological background to review, interpret seismic data. Extensive knowledge of Gulf Coast area. Permanent location in Houston. State age, training, experience. Salary commensurate with experience and general ability. Reply Box D-651, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer or Geologist with experience in evaluation and subsurface studies in Gulf Coast wanted by sound independent. Age 30-45. In application state salary expected and enclose college transcript. Box D-631, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER AND DISTRIBUTORS

Have unusual opportunity to offer. Must contact Pipe Line Superintendents, and all superintendents in the field, Supply Stores in field and Home Offices. Only complete Pipe Repair Gasket Stock on market, used by the Oil & Gas Industry for past 15 years. Also complete line packings and sheet gasket stock for every type job. Territory open United States and Foreign Countries. In reply give details. All company employes know of this AD.

BOX D-669

The Oil and Gas Journal, Tulsa, Okla.

SITUATIONS WANTED

DISTRICT REPRESENTATIVE, Sales Engineer, Manager for Texas or Gulf Coast. Experienced, capable, widely acquainted. Employed in key capacity, desire position offering better opportunity. Top business, personal references. Box D-657, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED GEOLOGIST-GEOPHYSICIST with thirteen years' service company work United States and Venezuela, including electrical logging, radioactivity logging, dipmeter, side-wall sampling, gun perforating, jet perforating, mud logging, mud control, cuttings and core analysis, etc. Last few years largely administrative and sales. Education includes all academic work for Ph.D. degree. Thirty-five years old, married, two children. Prefer administrative, sales, or combination position with aggressive service company or technical position with major oil company requiring extensive knowledge of any or all of above services, domestic or foreign. Excellent references. Desire personal interview. Box D-658, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM GEOLOGIST, B.S. degree, 5 years California experience and 2 foreign, now employed by major company in California wants position as geological consultant for strong independent company on salary and interest basis. Box D-668, The Oil and Gas Journal, Tulsa, Oklahoma.

MATERIALS: Refining and Production Materials Man Experienced in Control, Auditing, Inventory, Lease Mapping, and Purchasing. Can furnish best of references. Age 35. Box D-663, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

GEOLOGIST - GEOPHYSICIST now responsible for planning and directing exploration program for strong company is interested in joining aggressive independent operator or company on contract—salary — over-ride basis. Graduate geologist with twenty years geological and geophysical experience in Mid-Continent and Gulf Coast areas. Good discovery record. Services should be beneficial to one entering the oil business or one wishing to stepup exploration and development program. Apply Box D-647, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER — Operations Superintendent, Project Engineer. Twenty years' experience operation, maintenance, construction, engineering. All types of refineries, gasoline plants, chemical plants. Employed. Box D-659, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

GEOLOGIST: Twenty years Midcontinent experience. Seeks permanent affiliation with active Independent or Service Company. Available now. Box D-667, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Desires position with aggressive company. Thoroughly familiar with subsurface and drilling supervision. Experience in West Texas and Mid-Continent. Box D-649, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing, Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa, 3, Oklahoma.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorney, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

WANTED

WANTED: Small producing oil royalties. Also drilling deals. Navarro Royalties Company, Odessa, Texas.

WANTED: SURPLUS Chemicals, Oils, Waxes, Solvents, Wastes and Residues of all kinds. Chemical Service Corporation, 98-06 Beaver St., New York 5, N. Y.

SERVICES

SURVEY SERVICE

The next well you drill will be a producer, if, you use the most unique service of all times, an immediate decision rendered. A demonstration will convince the mind of any man. The gamble is too great, you cannot afford to go without it. Box D-664, The Oil and Gas Journal, Tulsa, Oklahoma.

NEVADA OIL AND GAS

Complete information on oil and gas possibilities in Nevada. Up-to-date lease maps.

Filing service. Daily and weekly filing and development information. Experienced geological consultants.

UNITED ENGINEERS
252 West 1st St., Rm. 3, Reno, Nevada
Phone 26354

LEASE AND DRILLING BLOCKS

WATER FLOOD 400 acres potential 1100 ft. can be purchased after coring. Box D-670, The Oil and Gas Journal, Tulsa, Oklahoma.

13 WELLS, 110 acre lease shallow producing from 700' Berea, near Ashland, O. Many good locations, low cost terms. E. N. Rehler, Allegany, N. Y.

TEN thousand acres leases on axis of former U.S. Petroleum Reserve, Rocky Mountain Region. Oil seeps from untested Madison, Devonian and Ordovician formations. Will make attractive deal. Box D-627, The Oil and Gas Journal, Tulsa, Oklahoma.

INVESTIGATE THIS!

7,400 acres, eight virgin structures, new field, new gas line, all production above 1000 feet. N. M. Sauls, Cookeville, Tennessee.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY
8376 Clayton Road, St. Louis 17, Mo.

XUM

Luling, Texas
September 7, 1950

TO THE OIL AND GAS FRATERNITY:

As a number of companies recently have expressed an interest in our Buckeye oil and gas leases, we have decided to offer all or a portion of them for development.

These leases are located in Matagorda County, Texas, ten miles southwest of Bay City and consist of approximately 9600 acres, the fee of which is in a very few owners. It is therefore easy to develop them in a scientific and orderly manner.

During the course of our development of the property we have recovered over 1,000,000 barrels of oil from the relatively shallow sands, being the upper Frio at a depth of 7800 to 8000 feet and the deeper horizons have become recognized as one of the best Deep Prospects on the Texas Gulf Coast. These leases are served by gas lines and are nearby to oil pipe lines. A part of the acreage borders on the Colorado River which promises to provide water transportation in the future.

The Directors offer to all responsible parties an opportunity to develop these properties. Those interested should communicate with the company at our office in Luling, Texas, on or before October 15, 1950. They will be glad to assist in any investigation of the properties which a prospective developer may care to make.

Faithfully yours,

UNITED NORTH AND SOUTH DEVELOPMENT COMPANY

By

Edgar B. Davis
Chairman

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

ELK CITY POOL—(Oklahoma)
Royalties at bargain. A. S. Berry, owner, 522 Wright Building, Tulsa, Oklahoma. Phone 5-5402. Investors with capital solicited for purchases in pool and trend.

WANTED
PRODUCING ROYALTIES
BOX 591, HOUSTON, TEXAS

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

MANUFACTURERS REPRESENTATIVE

MANUFACTURERS Representative covering Major Oil Companies New York Area seeks additional line. Centrifugal Pumps, Oil Field Engines or Electric Motors. Maintains Office, Warehouse and Shop. Box D-CL, The Oil and Gas Journal, 415 Lexington Avenue, New York.

EQUIPMENT MEN

(Continued from page 142)

Randolph Appointed Vice President of Oil Base

Thad Randolph, sales manager of Oil Base, Inc., has been appointed to a vice presidency, it is announced by George Miller, president. Randolph will retain his duties as director of sales for Black Magic, White Magic, mud-conditioning materials, mud guns, and all products manufactured by Oil Base. He succeeds J. A. Moore, who has resigned from active participation. Moore will remain on the board of directors at Oil Base, Inc.

American Steel & Wire Promotes P. T. Coons

Perry T. Coons, veteran of 40 years of sales service with American Steel & Wire Co., has been appointed assistant to vice president in charge of sales of this U. S. Steel subsidiary.

H. M. Francis, vice president, sales, also announced that the wire-rope and construction-materials division of the company, headed for 14 years by Coons, will be split into two separate sales units. M. E. Capouch was named manager of the construction-materials sales division and E. T. Eggers manager of the wire-rope sales division.

Coons, a graduate of Cornell University, started in the company's New York sales office in 1910, and since then has been identified with the company's sales activity in construction materials, wire rope, and tramway lines. Since 1937 he has been in Cleveland as manager of the wire-rope and construction-materials sales division.

After several years with Portland Cement Co. Capouch joined the Chicago sales office of American Steel & Wire Co. as a salesman in 1926. He held various assignments there and in 1945 came to Cleveland as assistant manager of the wire-rope and construction-materials division.

Eggers is a graduate of Penn State in architectural engineering. He started with the company in its Philadelphia office as a salesman in 1934, and a year later was transferred to the Chicago sales office. From that office he served the southwestern states, and in 1944 he was transferred to Dallas as midwest manager of oilfield wire-rope sales. In 1947 he came to Cleveland as assistant manager of the wire-rope and construction-materials division.

Bronold Heads Sales for Sterling Electric Motors

Alan J. Bronold has been appointed sales manager for Sterling Electric Motors, Inc., Los Angeles, according to an announcement by Earl Mendenhall, president.

Bronold will take over the duties of Allen Adams, who due to illness is stepping down from active sales management, but will continue on as secretary-treasurer of the company.

Bronold, a graduate electrical engineer of Bliss electrical school and business administration at Northwestern University, is also a Westinghouse graduate student, having received his B.S.E.E. in commercial electrical engineering. He was associated with Vacuum Oil Co. prior to 1926, and since then has been associated with Westinghouse Electric Corp., latterly as assistant general sales manager in charge of national sales for the Sturtevant Division, with headquarters in Boston.

In his new capacity Bronold will be responsible for the development and expansion of sales for Sterling Speed-Trol, and Slo-Speed electric power drives, and Sterling Klosd and Klosd-Tite constant-speed motors.

Logan Named Kansas City Manager for Eaton

Arthur Logan has been appointed manager of Eaton Metal Products office at Kansas City. He succeeds Ted Muller who was recently appointed vice president in charge of sales at the company's Denver division.

Logan has been associated with Eaton since 1944. Previous to his Kansas City appointment, he was in charge of the promotion of farm and L.P. gas equipment sales at Omaha.

Dorroh Sales Manager of Petroleum Distributing Co.

Cecil DeArman and Rex Hudson have announced the appointment of Olive Dorroh as manager of sales and branch warehouses for Petroleum Distributing Co. Dorroh has been in the general oil-field-supply business for the past 25 years. His duties are to coordinate sales and services of the 18 company branch warehouses that thoroughly cover the active oil fields. He will headquarter at the main office in Houston. Petroleum Distributing Co. is distributor of petroleum products and is exclusive distributor for Jimmie Gray tool-joint and drill-collar lubricants.

Wheatley to Represent Viking Pump in Tulsa

Beginning September 1, the Charles Wheatley Co. becomes Viking Pump Co. Tulsa representative, according to an announcement by Stanley A. Petersen, vice president and sales manager at Cedar Falls, Iowa. The Wheatley company will replace Warner Lewis Co., former Tulsa Viking representative.

Headquarters of Charles Wheatley Co. are at 414 South Detroit, Tulsa. The complete line of Viking rotary pumps for all types of petroleum handling as well as industrial applications will be handled.

Strawn District Manager for Indian Drilling Mud

B. L. (Red) Strawn, mud engineer, has been appointed district manager for Indian Drilling Mud Co.'s new warehouse at Farmington, N. M. This new warehouse has been opened with a complete stock of drilling muds, lost-circulation materials, and chemical combinations to serve the Rocky Mountain area.

(Additional Equipment Men in the News on page 135.)

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is herey given that the S½SE¼NW¼, NW¼SE¼, SW¼NE¼SE¼, sec. 11, T. 9 N., R. 79 W., 6th P.M., Colorado, 70 acres within the known geologic structure of the North McCallum field, will be offered for oil and gas leasing through competitive bidding at 1 p. m., Eastern Standard Time, September 20, 1950, when bids will be opened. Details of the lease offering, how and where to file bids and a description of the lands may be obtained by addressing an inquiry to the Manager of the Land Office, Denver, Colorado, or to this office. Marion Clawson, Director.

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CALENDAR

September

American Chemical Society, 118th national meeting, Stevens Hotel, Chicago, September 3-8.

American Association of Petroleum Geologists and Society of Exploration Geophysicists, regional meeting, jointly with Geological Association of Canada, Banff Springs Hotel, Banff, Alta., Canada., September 5-8.

National Chemical Exposition, Chicago Coliseum, Chicago, September 5-9.

American Institute of Chemical Engineers, regional meeting, Minneapolis, September 10-13.

Instrument Society of America, national exhibit and technical meeting, Coliseum, Houston, September 10-14.

American Petroleum Institute, Division of Transportation, Subcommittee on Products Pipe Line Technology, Lennox Hotel, St. Louis, Mo., September 11-13.

American Society of Mechanical Engineers, and Instrument Society of America, Municipal Auditorium, Buffalo, N. Y., September 11-15.

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 13-15

National Association of Corrosion Engineers, Shreveport section, school meeting, Caddo Hotel, Shreveport, September 13-15.

American Petroleum Institute, Lubrication Committee, Hotel Traymore, Atlantic City, September 14.

Instrument Society of America, annual instrument conference and exhibit, Municipal Auditorium, Buffalo, N. Y., September 18-22.

American Society of Mechanical Engineers, fall meeting, Hotel Sheraton, Worcester, Mass., September 19-21.

American Society of Mechanical Engineers, petroleum mechanical engineering conference, Roosevelt Hotel, New Orleans, September 24-28

Ohio Mineral Industries Conference, sponsored by Ohio State University and Ohio Department of Natural Resources, Ohio Museum Auditorium, Columbus, September 25-26.

October

Independent Petroleum Association of America, annual membership meeting, Jefferson Hotel, St. Louis, October 2-3.

American Gas Association annual convention, Atlantic City, N. J., October 3-6.

Mid-Continent Oil and Gas Association, Texas division, Dallas, October 4-5.

Petroleum Branch, American Institute of Mining and Metallurgical Engineers, Mid-Continent meeting, Roosevelt Hotel, New Orleans, October 4-6.

American Association of Oilwell Drilling Contractors, annual meeting, Mayo Hotel, Tulsa, October 9-10.

Instrumentation for the Process Industries, fifth annual symposium, Texas A. & M. College, College Station, Tex., October 11-13.

Petroleum Branch, American Institute of Mining and Metallurgical Engineers, West Coast meeting, Elks Club, Los Angeles, October 12-13.

Oil Progress Week, October 16-21.

American Association of Petroleum Geologists, Pacific Section, Ambassador Hotel, Los Angeles, October 19-20.

Society of Economic Paleontologists and Mineralogists, Pacific Coast Section, Ambassador Hotel, Los Angeles, October 19-20.

Society of Exploration Geophysicists, Ambassador Hotel, Los Angeles, October 19-20.

Permian Basin Oil Show, Odessa, Tex., October 19-22.

Independent Natural Gas Association of America, annual meeting, Shamrock Hotel, Houston, October 23

National Lubricating Grease Institute, annual meeting, Edgewater Beach Hotel, Chicago, October 30-November 1.

November

Mid-Continent Oil and Gas Association, Louisiana-Arkansas Division, annual meeting, Roosevelt Hotel, New Orleans, November 2-3.

Society of Automotive Engineers, Fuels and Lubricants meeting, Mayo Hotel, Tulsa, November 9-10.

California Natural Gasoline Association, Silver Anniversary, Los Angeles, November 9-10.

American Petroleum Institute, annual meeting, Biltmore and Ambassador Hotels, Los Angeles, November 13-16.

American Society of Mechanical Engineers, annual meeting, Grand Central Palace, New York, November 27-December 1.

December

American Institute of Chemical Engineers, annual meeting, Columbus, Ohio, December 3-6.

Interstate Oil Compact Commission, winter meeting, Shamrock Hotel, Houston, December 11-13.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month. Jonathan Club.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is herey given that 41 acres within the known geologic structure of the West and Middle Red River oil and gas field, Tillman County, Oklahoma, will be offered for oil and gas leasing, through competitive bidding at 1 p. m., Eastern Standard Time, September 20, 1950, when bids will be opened. The details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Regional Administrator, Region V, Albuquerque, New Mexico, or to this office. Marion Clawson, Director.

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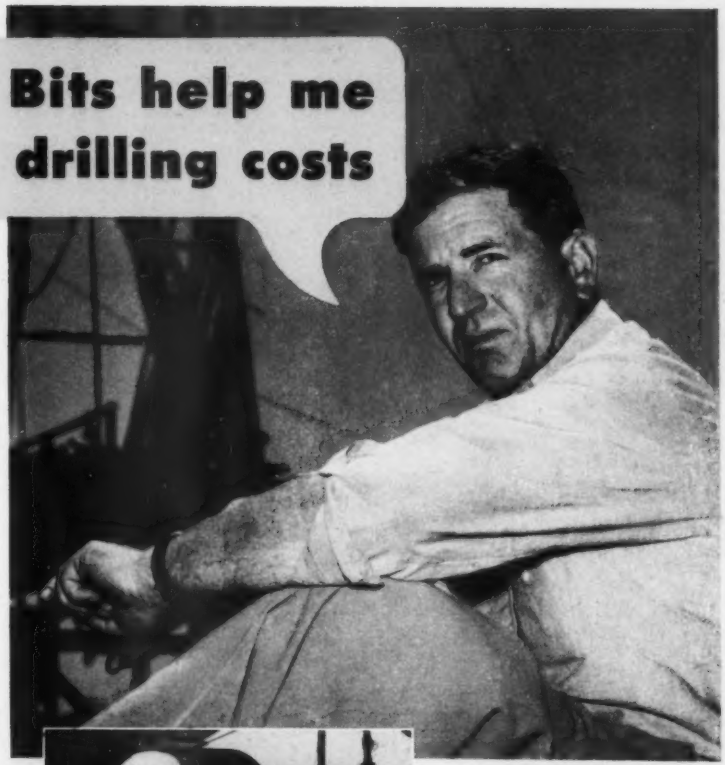
Reed Rock Bits help me keep down drilling costs



D. S. Kirklin, Tool Pusher for Gardner Bros. Drilling Co. in West Texas, says: "The long runs I get from Reed "LB" Rock Bits save money on both bit costs and round trip time. Over a year, these savings mount up to a big figure."

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